NATIONAL EDITION

Food Industries

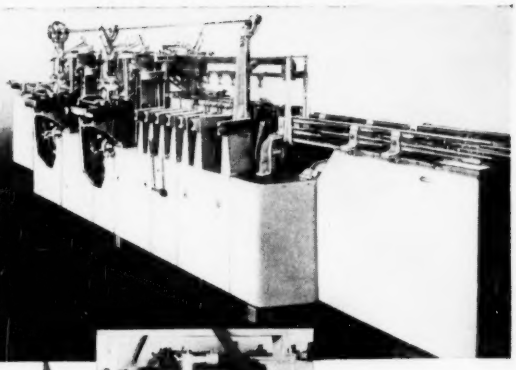
For those who control quality and costs through management and production—a McGraw-Hill publication

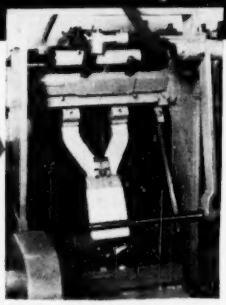
Birds Eye develops efficient continuous process for French fries. Here product is inspected before blanching. (Page 113)

MAY, 1950: Equipment materials evaluated, How to pick supervisors, Ingenious chromatography, Combat packages, Fine chocolate, Good catchup

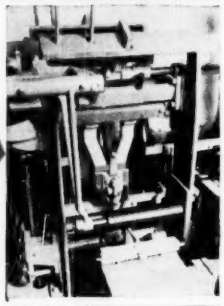
"VG" ON THE BEE-LINE GIVES YOU THE WORLD'S NEATEST SMOOTHEST MOST COMPLETE LABELING WITH *Controlled Registration*

VG is new. It's the *Vacuum Gripfinger* method engineered for the WORLD famous BEE-LINE LABELER. VG allows no label area to remain ungummed . . . spreads adhesive evenly over entire body labels, neck or shoulder labels, and medallions, too . . . and holds any or all of them firmly in position for precision-controlled register. Three pressure applications to each label assure superbly smooth, skin-tight label application at a rate up to 2 a second — and faster. Bring your labeling up to 1950 standards with the VG-equipped WORLD BEE-LINE LABELER — or by adding the VG feature to your present BEE-LINE. Write for information.

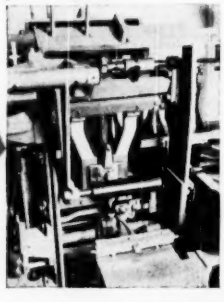




● Here are the pickers on their way down to the container, showing body and medallion labels. Gum box, label holder and transfer roll removed so you can see what happens.



● Here the Vacuum Gripfinger contacts the closed pickers, sandwiching the label. Note the bellows in the lower left hand corner. Its action produces the vacuum.



● Here at the container itself the pickers are opening for gumming the entire surface of the labels on them, coating adhesive over the label surfaces while vacuum holds the labels securely and precisely for *controlled* registration on the container.

"YOU GET THE BEST LABELERS IN THE WORLD"

ECONOMIC MACHINERY COMPANY

Builders of World Automatic and Semi-Automatic Labelers for Every Purpose

WORCESTER, MASSACHUSETTS

New York Philadelphia Pittsburgh Chicago San Francisco Los Angeles Denver Louisville Salt Lake City El Paso Seattle Portland Winnipeg London Montreal Toronto Winnipeg Newfoundland Vancouver Mexico City Sydney, Australia Wellington, N.Z. San Juan, P.R. Ciudad Trujillo, D.R. Honolulu, T. H.

FREE READER SERVICE . . .

HOW IT WORKS—Mail one of the postcards at right. Before mailing, circle page numbers of items about which you want more details. Then write your name and address at bottom of card. That's all there is to it. No stamp required. Your requests will be forwarded to company concerned, the answer coming directly to you.

TO MAKE IT HANDY—Products and literature in this issue are listed on these pages. Those in the equipment, catalogs, and new package departments are directly below. Advertised products are listed in columns next to postcards on next sheet. Advertisements are indexed, too, starting on following page.

NUMBERS EXPLAINED—Following each product listed is number of page on which it appears, and you will find this number on the postcard for convenient circling. Letters, as A, B, C, after items on an editorial page, designate specific items on that page. Letters following advertising page numbers give positions of the ads on the pages—T means top; B, bottom; R, right; L, left; TR, top right; etc.

OTHER REQUEST, OR COMMENT—Below the numbers on the cards is space where you may put in a question or comment pertaining to anything in the issue.

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Company .....

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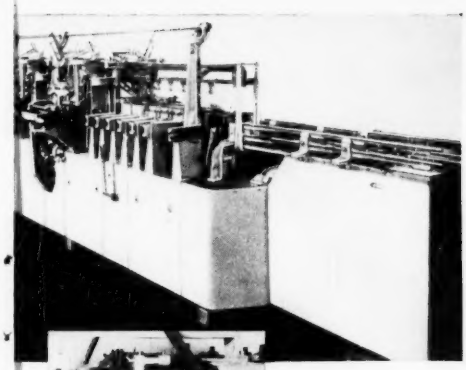

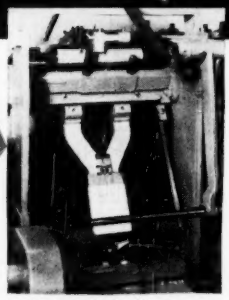

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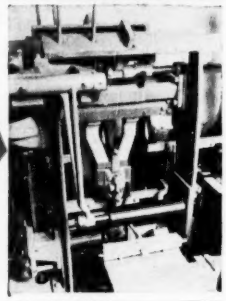

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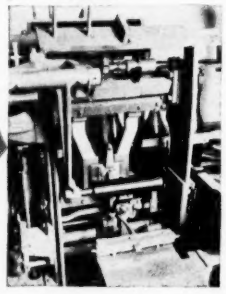

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ACHINERY COMPANY
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PRODUCTS ADVERTISED

FOR MORE DETAILS CIRCLE NUMBERS AND MAIL CARD

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128B	133A	148A	203C	203M	204B				
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SERVING THE FOOD INDUSTRY FOR 103 YEARS

HIGHLIGHTS

Food manufacturers would pay a processing tax to finance farm price supports under a plan being talked about by Republicans. Program would limit support payments to crops going into domestic human consumption. Would also add to the processor's already surplus supply of woes. (See News)

Good frozen concentrated milk—with a 2½-to-1 concentration—has been produced experimentally, according to information from a reliable source. But a 3-to-1 concentration is considered advisable, and apparently is not yet entirely feasible. Several groups are working on the problem and eventual success is likely. Meanwhile, beware of false rumors.

Something new in continuous processing is being used by John Morrell, Ottumwa, Iowa. It is the centrifuging of tankage slurry to remove meal cake, followed by centrifuging of the water to recover grease. One man operates the process, which eliminates floor mess and odor, gives high protein and grease recovery, and reduces B.O.D. of sewage. Here is an achievement that foretells other applications. (See article)

Discovery of aureomycin's growth producing qualities gives promise of lower cost meats and greater quantities. Five pounds added to 1 ton of feed has increased hog and poultry growth rate by as much as 50 percent in experiments. May also make a vegetable diet nutritionally equal to one containing animal products. Our latest "wonder" drug is becoming a wonder food.

Automatic folding and sealing of large multiwall shipping sacks containing small consumer size bags is accomplished by a new machine. The unit will handle multiwall bags as large as 22x12x24 in. at the rate of 18 per min. (See Equipment)

Lemonade frozen concentrate has been added to Minute Maid's line. Made at the Sunkist plant in California, it should beat the hot weather to market. Minute Maid has also moved into California to produce orange juice concentrate from reasonably priced Sunkist oranges—a step that was long overdue in the view of all Californians.

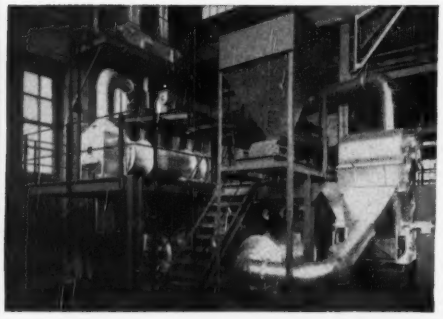
Ice cream home delivery service has been introduced in Bergen County, N. J., by Vogt's Ice Cream, Inc. Twelve items and 35 flavors are being distributed by a fleet of 20 refrigerated trucks on a seven-day-a-week schedule. Seems they weren't satisfied to just sit and wait for customers.

To keep insects out of food packages, cellulose wadding impregnated with DDT has been developed in England. Used to line shipping cases or to wrap cartons, this inexpensive material kills insects as they wander through its openings enroute to the packaged food. Nice trick. (See article)

Good supervisors can be differentiated from poor ones, and an individual's performance in a supervisory job can be predicted. And it is done with about 96 percent accuracy by psychological examinations and interviews. This has been demonstrated in tests of more than 375 cannery workers. So it's not just theory. (See article)

Automatic packaging of French fries for freezing has been achieved at Birds Eye's new Caribou, Me., plant. Two carton formers supply empties to four weighing-filling machines, and filled packages are wrapped and heat-sealed by one machine. (For details on the production and packaging of frozen French fries see article and picture flowsheet)

You Don't Guess HOW



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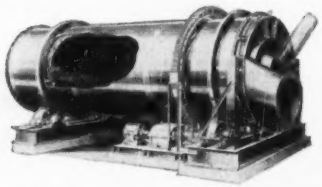

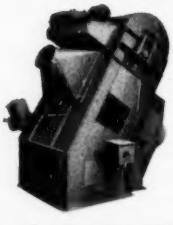

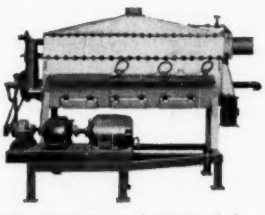

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The Talk of the Industry

Eisenhower Gave You a Tip

While we are publishing a series of articles on the food requirements of the armed forces, we fervently hope that we are wasting space. But you have read what General Eisenhower and Bernard Baruch have said about preparedness. And a private English news source, which called the turn on the first Russian atom bomb, says that a second one has been exploded. So it's well to get ready, especially when the research involved will contribute to peacetime progress—as it will in food processing and packaging.

Price War Backfires on Processors

Price wars between food processors or distributors can backfire in an unexpected manner. Fluid milk processors in New York have found that out. Price cuts created the false popular impression that profit was large enough to allow such cuts without corresponding reductions in the cost of labor and raw milk. This nullified the effects of long efforts to create a better popular understanding of the economics of milk distribution.

No one ever wins a war.

More Ulcers for Management

Major organizations of the grocery industry have selected representatives to work with the Federal Trade Commission in drafting the proposed new trade-practice rules. Any persons interested can present their ideas through these distinguished spokesmen of industry, or directly to the Commission. The result will be publicly distributed as a preliminary draft on which general industry comment will be sought before the final provisions are established.

If this program follows the usual course, there will be little technological material in the regulations. Most will deal with purely merchandising and trade-practice problems. Which puts it up to management, rather than technologists, to do the worrying.

How To Keep Stockholders Happy

What with the scarcity of risk capital, it would seem advisable for food companies to keep their stockholders happy. One way of doing this is to take a leaf from Borden's book and ask your stockholders what they want to know about their company and its operations.

Borden found that its owners were interested in the size of the dividend payments—which is hardly surprising. But a third also were curious about future growth, research and new products. Twelve percent wanted lists of products and of places where they could be purchased. An equal number asked for facts about changes in the competitive picture. But this one is the payoff: Only 2 percent were interested in the executives' salaries.

Plain Truth Can't Be Told

Frozen food competition seems to be getting in the hair of fresh produce distributors. National League of Wholesale Fresh Fruit & Vegetable distributors has complained to the Federal Trade Commission about frozen food ads which make the "fresher than fresh" claim. This infers, says NLWFEV, that fresh products are inferior in some unexplained manner, and besides frozen foods are processed by blanching and freezing and therefore can't be "fresh."

Just goes to show the inadequacy of the English language. Frozen foods often have a better-than-fresh quality because natural processes of deterioration are arrested between farm and table by man-made processes of preservation. But this fact apparently must be spelled out in obtuse words.

Don't Put Eggs in Legal Basket

It is risky to depend upon patents or secrecy to keep you ahead of your competitors in processing efficiency. Secrets leak out and smart lawyers upset patents. It's better to follow the lead of the president of a large food corporation. Having lost an important patent infringement suit, he told his technologists and engineers that his lawyers were no good, so it was up to his technical men to keep the company out in front through constant improvement of equipment and technology.

Fowl Figures for Politicians

Of each dollar spent for western dressed turkeys in New York and Chicago last year, approximately 75 cents went to the farmer who grew the fowl. The retailer got 11 to 15 cents, wholesalers 1 to 3½ cents, processors about 6 cents. Transportation, of course, had to be paid.

Although they come from the Bureau of Agricultural Economics, these figures don't quite jibe with all the yelling the government boys do about profiteering middlemen.

Hors d'Oeuvres

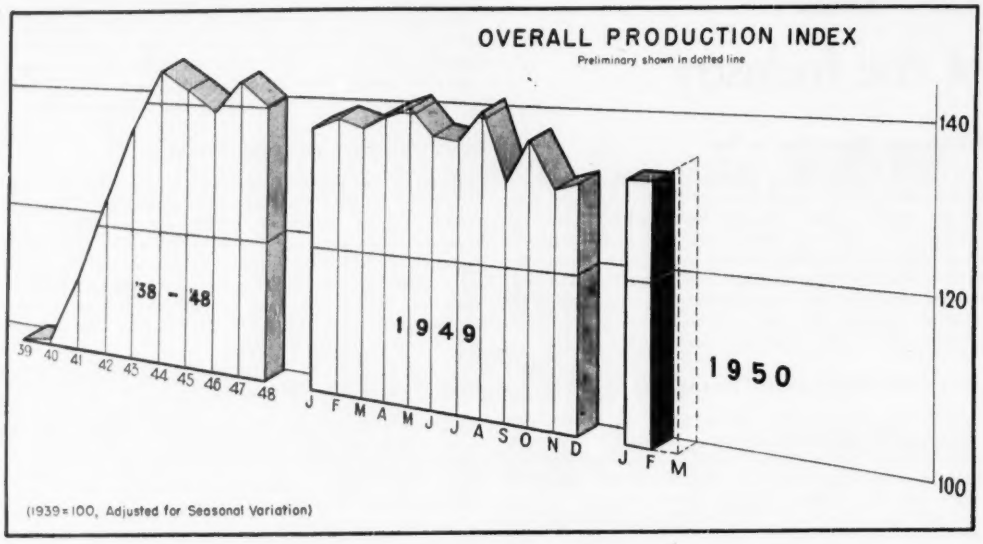
■ Man from Refrigeration Research Foundation—signs himself "Dutch"—says names for bigger olives (above "Special Super-Colossal") pose no problem whatever. For the next three sizes he offers "Cosmic, Promethean, and Californian, in this order, going upward." We carefully guard his identity because he lets "the Southwest Empire take over from there." Says maybe someone down there might suggest "Texan." Haven't even heard from Chicago on this proposition.

■ A pharmacy prof at the U. of Oklahoma has come up with a kit of scented chemicals, each having a different aroma, to increase catches of fish. And a California company is supposed to be testing the kit for commercial fishing in the Pacific. Lot of fish that walk let the same thing happen to them.

■ At long last, Mead Johnson is going to sell its two precooked infant cereals direct to the grocery trade, through food brokers, along with the long established distribution through the drug trade. This should firmly establish the grocery trade as a very good channel for selling food in packages.

■ That slogan to promote spring and summer cranberry consumption, to wit: "The Team That's Clickin, Ocean Spray and Chicken" has us a little worried. Could lead to a plague. As an example of what could happen we offer: "Stay Out of the Red, Stoke Up On Bread" and "If You Want to Feel Dandy, Do Your Munching On Candy." Had enuff? **J.A.J.J.**

FI Index and Outlook



Food Output Through First Quarter Indicates a Consistent Rise

WITH OUTPUT holding exceptionally steady through February, the revised figure for the overall index remained at 133, its position in January. The March preliminary, however, moves up to 135.

All told, first quarter production of processed food formed part of a general upswing in the nation's manufacturing industries. Output of textiles, paper, and chemicals also reached very high levels. In fact, most of these "soft goods", which usually show about the same trends as food, came close to postwar production peaks. This suggests that food output should continue gaining in the second quarter. For processing activity began to rise somewhat later than other lines and is still well below its 1948 high.

Meanwhile, the heavy industries, whose payrolls furnish so much of the buying power for food purchases, have been going stronger every month. And the effect of high employment in the hard-goods field can be seen in retail food sales. Prices have been relatively firm despite increasing food supplies. And the unit volume being done by grocery stores is higher than a year ago.

It is now evident that the spring months of 1950 are generally prosperous. And there appears to be a good chance that these favorable conditions will last for most of the year. This indicates a strong retail market for processed foods, particularly the more expensive foods, such as meats and frozen fruits and vegetables. The possibility of distributors reducing inventories, as they did in 1949, has lessened. In fact, inventories may have to be built up. And all this will call for a high level of processing activity.

Restaurant Buying Down

The recent upswing in food sales has been confined to food for home cooking. Hotel and restaurant business is still sliding, as it did all during 1949. Back in 1946, people spent almost half as much money eating out as they did on food to take home. In 1949, the proportion was not much over a third. That may be the ratio for the future. It is about what prevailed in prewar years. But it is also possible that, with high incomes, people will eat out a little more often in 1950.

Institutional Outlets

Hotels and restaurants are trying to get foods that are close-to-ready for serving in order to offset their high labor costs. One of the most important trends in processing is more extensive preparation of foods for these outlets. A large group of hotels, for example, has arranged to have meat, fish and poultry delivered in "prefabricated" cuts. The cuts are completely prepared by packers to meet exact restaurant requirements for final consumption. Orders are placed for quantities of specific cuts, such as lamb chops, rather than for whole sides of meat.

This method allows the restaurant operator to maintain better control of his inventory. It also reduces his labor and storage requirements. The overall saving in restaurant operating costs is estimated at 12 to 15 percent. And this more than offsets the greater

At a Glance—

(1939 = 100, with all figures adjusted for seasonal variations.)

	Feb. 1950	Jan. 1950	Percent Change	Year Ago
Baking	124	121	+2	126
Butter	85	85	...	81
Canning	146	146	...	147
Cheese	169	181	−7	178
Confectionery	122	124	−1	132
Evap. Milk	146	144	+1	128
Flour	111	112	−1	123
Ice Cream	194	193	...	187
Malt Liquors	164	158	+4	159
Margarine	294	295	...	276
Meat Products	145	146	−1	147
Sugar	95	90	+6	103

cost of prepackaged cuts. Another restaurant trend is the purchase of precooked staple foods that can be "reconstituted" on order by radar type ranges in the kitchen. And, of course, the use of frozen items is growing.

These practices will increase the amount of work to be done by the food manufacturers. Not only more labor and equipment, but more storage and packaging will be required. The long term trend seems to be gradual absorption of the complete preparation job by the primary food processors.

Upturn in Baking?

After lagging for several months, the baking industry may be about to stage a recovery. Bakery sales have received a noticeable stimulus from the introduction of partly baked bread and rolls, known as "brown 'n serve". Housewives are reportedly enthusiastic about these new items because they have a fresh baked flavor but require little work compared to old-time home baking.

The process has been promoted by General Mills. And the flour industry will benefit from the bakers' sales gain. (So will makers of sugar, butter and shortening). However, it is not clear whether the new products will be enough to halt the long term downtrend which has persisted in the flour and baking group.

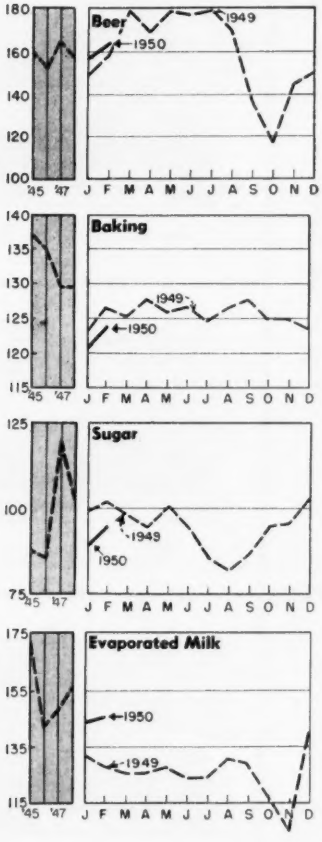
About 1,000 flour mills of all types are estimated to have ceased business since 1945. Over 100 good-sized mills have shut down since 1947. The decline in export shipments accounts for much of this trouble. In 1947, we sent nearly 10,000,000,000 lb. of flour abroad. Last year, the total was only 3,000,000,000. And this year's shipments are running nearly a third lower. European recovery has reduced flour requirements, as expected. But exports to Latin America have also taken an unlooked-for plunge, due mainly to the higher prices mentioned for the U. S. product.

Domestic consumption has fallen steadily also, from 225 lb. per capita in 1900 to about 135 lb. in 1949. The reason is that people are eating more meats, dairy products, fruits and vegetables. Best chance for raising flour consumption seems to be in specialty baked goods. The merchandising campaign for "brown 'n serve" rolls may give some idea what can be done in this direction.

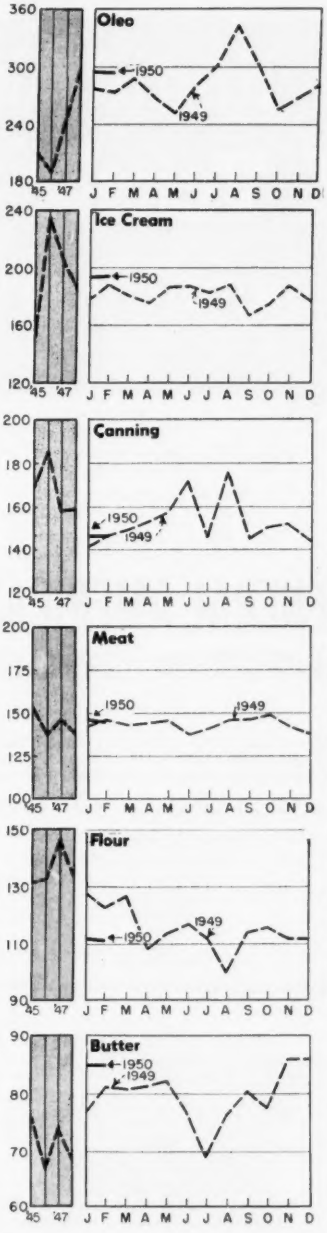
Ice Cream Gaining

After a long decline during 1949, ice cream production rebounded in the first quarter. An important reason, according to the International Association of Ice Cream Manufacturers, has been a step-up in promotional effort. National advertising has evidently been highly effective in promoting retail sales and making a higher level of output possible for the manufacturers. The success of merchandising efforts will probably also be a governing factor on production of other dairy products, which are all in large supply.

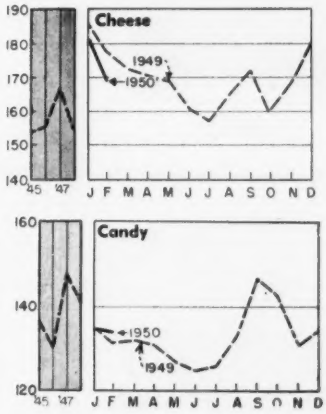
RISING ▲

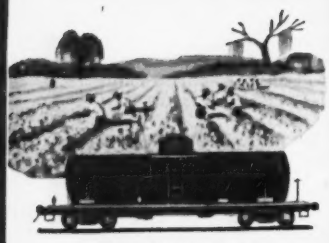


STEADY ➔

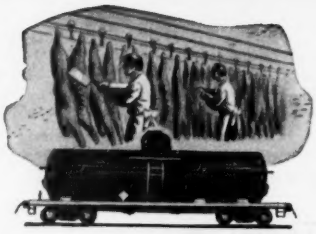


FALLING ▼

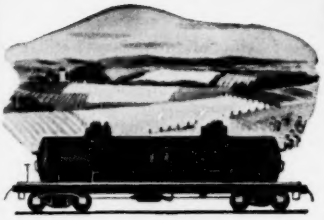




COTTONSEED OIL



LARD



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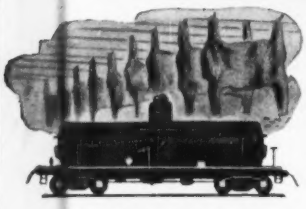

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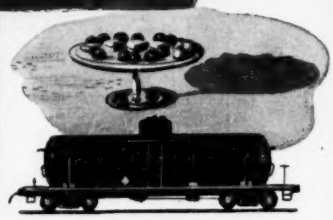
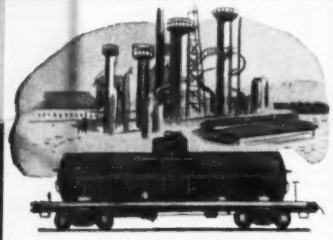
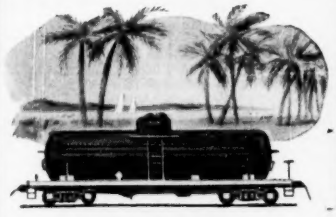


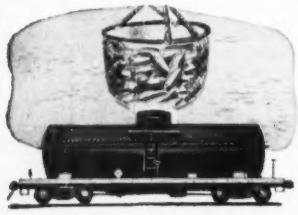
CORN SYRUP UNMIXED



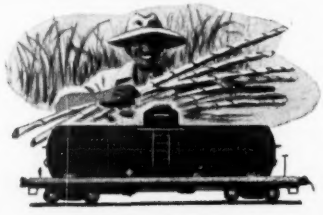
CORN OIL



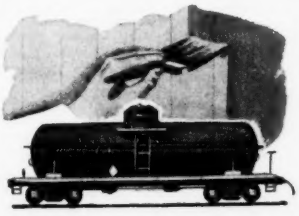
COCONUT OIL



FISH OIL



MOLASSES



TUNG OIL

What Washington Thinks

TAX-CONSCIOUS—Washington is thinking more and more about the problems of the national budget as it relates to general business conditions. This seems just now to be more than the perennial criticism of the Administration by the minority party spokesman. Several factors have contributed. Everyone knows that continued deficit spending by the government in peacetime is dangerous. Unemployment has been creeping up and up, to a point that represents a significant social problem as well as a political threat. Reports of business difficulties are not mere sporadic occurrences. This does not mean depression soon, not even another recession. But it does mean that Washington must give rather more serious attention than it has to federal spending and federal taxes.

OVERTIME—Under the modified "Fair Labor Standards Act" there is not only a higher minimum wage of 75c, but also a new series of interpretations on overtime pay. It is correspondingly important that every factory executive acquaint himself with the new rules so that worker assignments will not become needlessly expensive because of extra compensation under the new rules. Interpretative bulletin covering all these details can be had for the asking from Wage and Hour Division, Department of Labor, Washington, 25, DC.

RESIDUES—Hearings on chemical residues found on fruits and vegetables have been going on for about three months as this is written. The proceeding has been orderly and constructive, not controversial as some feared. Apparently convincingly established is one general fact: Commercial crops of fruits and vegetables cannot be produced without extensive and careful use of pest control chemicals. That generalization seems to establish the further fact that the food industries must live with the chemical removal problem from now on, whenever using these types of raw materials. Thus far there has been no discussion of removal of residues or of the tolerances that are inevitable or permissable. These questions will be discussed from now on, probably for the rest of the calendar year.

GERMAN TECHNOLOGY—Processing and packaging of foods as done in Germany during the war period has been very extensively surveyed by American scientific and technical field parties. The result is a large ten part report recently made available by Office of Technical Services, Department of Commerce. The complete document can be had in photostat form for $68.75 or on microfilm for $9.00 The total of 550 pages, which make up this P. B. 99020, deal in turn with: Canned foods and food cans, frozen foods, dehydrated foods, processed and packaged meats and meat products, milling and baking, edible fat and oils industries, specialty and saccharine products, feeding the German army, wartime food research activities, and civilian food rationing in wartime.

PEST FORECASTS—Insect pests may cause farmers very great trouble in 1950. And this will give corresponding difficulty to the purchaser of agricultural raw materials. This is not unusual. But the growing forecast service of the U. S. Department of Agriculture promises to help out in these matters. Surveys, for example, have been made throughout the country to estimate the number of grasshopper eggs. On the basis of egg counts the prospective threat to crops can be moderately well forecast. Food companies that are concerned with questions like this will do well to ask Bureau of Entomology whether they have any helpful information to prejudge specific crop threats. Where such threat is expected, preparation with generous supplies of insecticide and with instructions for farmers whose crops may be jeopardized, may minimize trouble that otherwise would become serious. Top executives of the Bureau are not too confident that all of their forecasts are dependable. But they are certainly much too valuable to be ignored by any food enterprise that might be seriously affected.

POLLUTION CONFERENCE—"The contamination of the atmosphere and its potential adverse effects on health, industry, agriculture, and natural resources are causing wide concern." President Truman in this manner addressed the Secretary of the Interior and requested that an interdepartmental committee conduct a technical conference on air pollution. That conference was scheduled for May 3, 4 and 5.

This is only one more evidence that the government is going to continue to stir up investigations and demand corrective measures wherever it appears that the atmosphere is being polluted by dust, fumes, or odors from any mine, factory, or other industrial operation. One expected result is new criticism of any industrial operation that may fall within this category, whether the air contamination is serious, only annoying, or barely noticeable. Many food companies, which have never before been thought nuisance neighbors, may suddenly find themselves subject to criticism. Corrective measures to anticipate such complication and prevent difficulty will certainly be worthwhile.

NEW PARITY PRICES—Congress has devised a new basis for parity prices, the application of which was scheduled to begin the first of the year. As publicized, the new law was expected to raise some parity prices and lower others. Actually, the way the law works, there have been only a considerable number of increases in parity, and hence the prospect of more price maintenance programs. Thus far almost none of the forecast cuts in parity has occurred, because of the queer way in which the new base period is defined. The overall effect is to prevent still longer the decline of prices of many agricultural products.

NONFAT DRY MILK—To increase stability of the dairy products business, as an aid to farmers, there is continuing pressure to increase the use of nonfat dry milk solids. Present production is approximately double that of eight years ago, but even so it is by no means exhausting the possibilities of the present skim-milk surplus. Enthusiastic support will be given by Uncle Sam to anyone who will develop further uses for this or other low-value milk by-products.

OIL SURPLUS—One of the most worrysome agricultural problems to the technical men in the Department of Agriculture is that of growing surpluses of fats and oils. Various agencies of the Department are making field surveys in the hope of developing new non-food uses of both fats and oil-seed meal, in which the protein is most important. Anyone who has an idea about new markets will get enthusiastic official support on any promising program.

—R. S. McBride, Washington, D. C.

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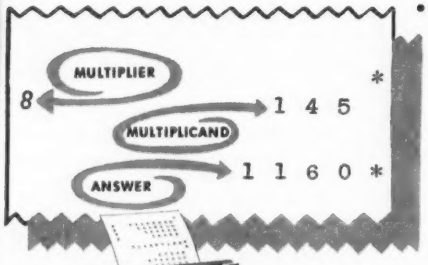

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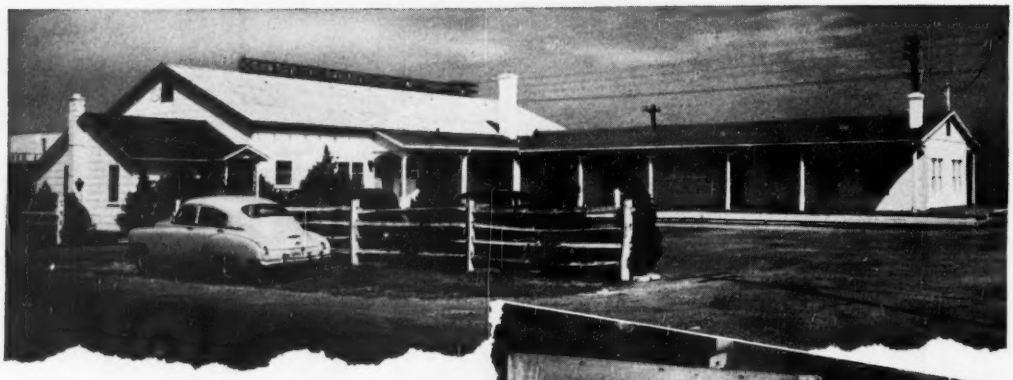

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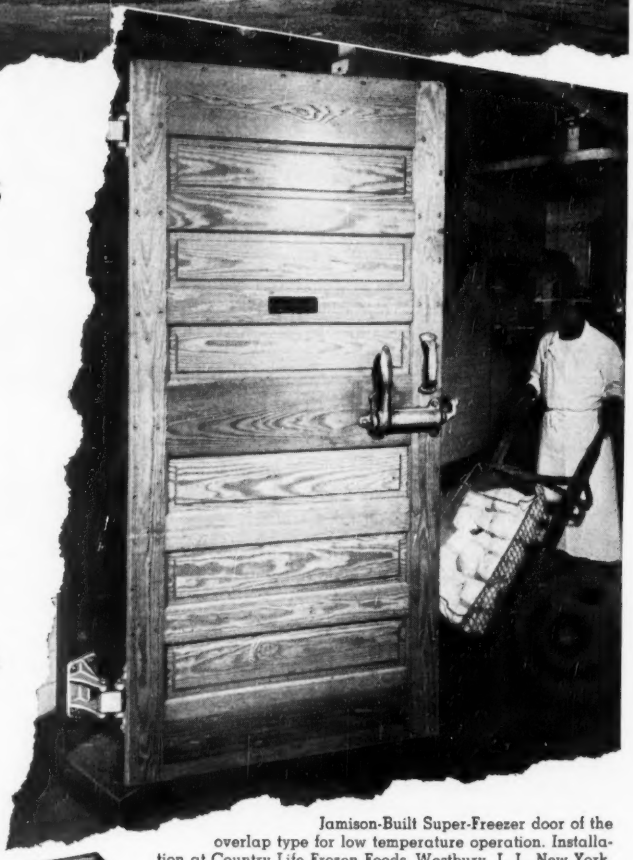

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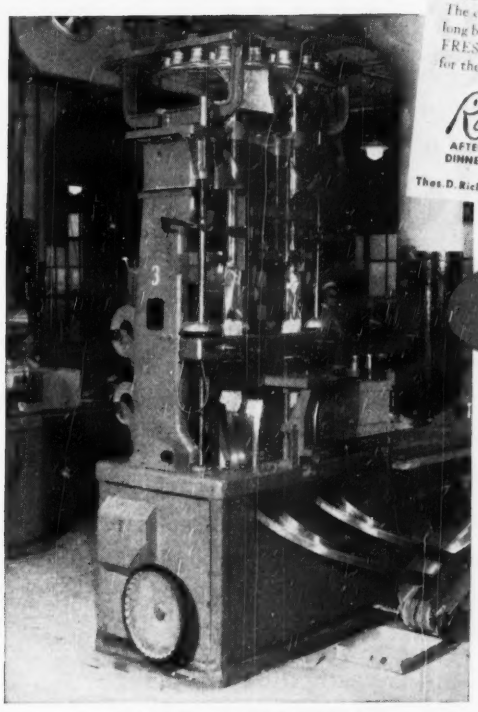

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Here's what is being done to bring you more Cellophane

The Du Pont Company regrets that it is unable, at this time, to meet the growing requirements of its customers for Cellophane. It believes that all those concerned with packaging should be fully informed as to the facts regarding the shortage and what is being done about it.

Several years ago, Du Pont foresaw a substantial increase in the use of Cellophane and planned to build additional plant capacity, to become available about the middle of 1949, in order to take care of the expanding market.

Preliminary plans, estimates and investigation of plant sites were well under way when the Department of Justice brought suit in December 1947, charging that our position in the Cellophane business constitutes a monopoly.

The Du Pont Company is resisting to the fullest extent the charges brought by the Department of Justice, but, pending the outcome of this litigation, it was considered unwise to proceed with the proposed construction.

Du Pont, therefore, actively sought to interest others in the manufacture of Cellophane, in order that additional film would be available to the trade as soon as possible. It required more than a year and a half to find a company willing and able to invest the large amount of capital—approximately $20,000,000 —necessary to enter the field on an economically efficient basis.

Now, construction is under way on a new Cellophane plant, designed and being built by Du Pont for Olin Industries, Inc., at Pisgah Forest, North Carolina, to have an initial capacity of about 33 million pounds annually. All Du Pont Cellophane patents and know-how are being made available to them. It is hoped that this plant will be in production by the middle of next year.

In addition to this, other manufacturers of transparent films have announced in the public press substantial increases in their production facilities during the current year.

Thus the supply of Cellophane will be increasing from now on, even if not from Du Pont at this time.

E. I. du Pont de Nemours & Co. (Inc.), Film Department, Wilmington 98, Delaware.

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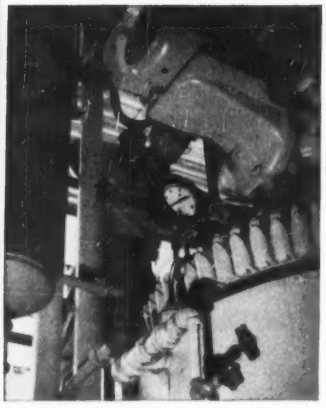

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Until now vitamin A potencies have been officially measured in terms of growth curves of rats. The recently published 14th Edition of the United States Pharmacopoeia specifies a new method of vitamin A assay based on spectrophotometric (Morton-Stubbs) and chemical (Carr-Price) comparison with the U.S.P. Vitamin A Reference Standard.

DPi Distilled Natural Vitamin A Esters and Myvax Synthetic Vitamin A Esters —the first synthetic vitamin A offered in the United States, now well into the second year of continuous successful commercial production — are already being labeled in accordance with the new method of assay.

No vitamin A prepared from natural sources is better suited than DPi Distilled Vitamin A Esters to the more precise assay method. The reason is quite straightforward.

It is for the ultraviolet absorption of substances other than vitamin A that Drs. Morton and Stubbs devised their correction procedure. But DPi's unique molecular distillation process has always removed these irrelevant absorbers, just as it removes the foul-smelling and foul-tasting components of crude fish-liver oils. (The small correction necessary is due to the fact that the U.S.P. Standard contains only one of two naturally occurring geometric isomers of vitamin A.)

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Current quotations for DPi Distilled Vitamin A Esters, Myvapack Vitamin A Concentrate (in 400-gram cans pre-measured to individual vitamin A potency specifications), Myva-Dry Vitamin A Powder, Myvax Synthetic Vitamin A Acetate, and Myvax 16 Synthetic Vitamin A Palmitate, all represent fully competitive prices per U.S.P. XIV unit of vitamin A. Write, wire, or phone for them.

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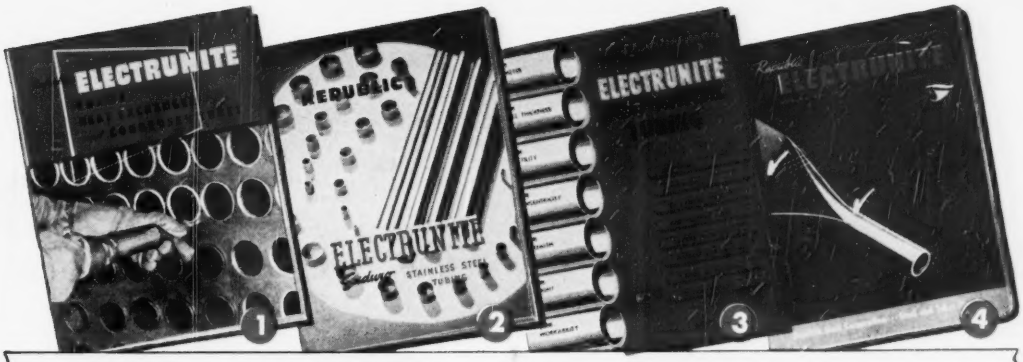

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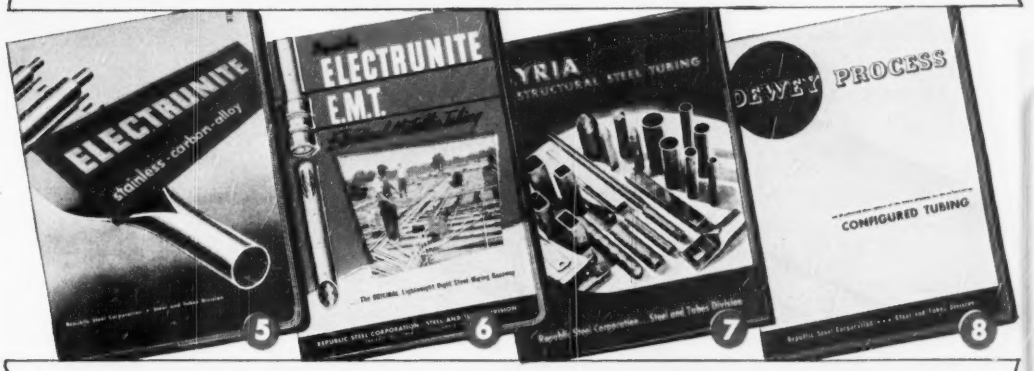

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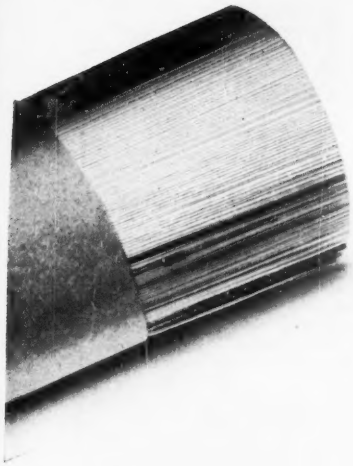
America's Ten Largest Magazines of Audited Circulation • Publishers' Statements for Last Six Months of 1949

CIRCULATION	MAGAZINE	CASH-AND-CARRY CIRCULATION (SINGLE COPY SALES) 1,000,000 2,000,000 3,000,000 4,000,000
5,305,394	Life	
4,429,260	Ladies' Home Journal	
4,010,219	Saturday Evening Post	
4,000,156	Woman's Home Companion	
3,937,386	McCall's	
3,458,080	WOMAN'S DAY	
3,291,829	Better Homes and Gardens	
3,140,371	Collier's	
3,110,040	Look	
3,080,493	Good Housekeeping	

Why are single copy sales the cream of magazine circulation?

Because they are buyer-initiated. Because no premiums or pressures, no song-and-dance, no special inducements bring the sales in. The single copy sale reflects the reader's desire to buy, rather than the publisher's desire to sell.

the greatest cash-and-carry circulation



An unopened magazine can't whip up much enthusiasm for the products between its covers. And there are plenty of unopened magazines—plenty of Annies who don't live there any more. That's just one example of the waste circulation in subscription figures.

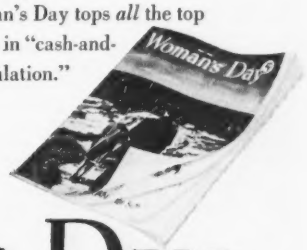
THAT'S WHY WE SAY "CASH".
The woman who puts out cash for a single copy of a magazine is going to read that magazine. Her cash is ready money . . . money she's ready and able to spend to buy her the things she wants.

THAT'S WHY WE SAY "CARRY".
The customer who's up and around, eager to buy and read, is a far more promising prospect than Annie . . . who isn't reading in December what she subscribed to in May.

"CASH-AND-CARRY" . . . YOUR MOST VALUABLE CIRCULATION.
Cash-and-carry magazine sales are made to active customers who pay money on the spot for the things they want . . . and that can mean your product.

and- carry circulation"

Every sale of Woman's Day is a cash-and-carry sale . . . and Woman's Day tops *all* the top magazines in "cash-and-carry circulation."



of all magazines **Woman's Day**

on sale at all A & P Food Stores—5¢

For power, for value, for every job
THEY'RE GREATER THAN EVER

Year after year the nation's truck users buy more Chevrolet trucks than any other make. For every kind of trucking job they prefer Chevrolet power and Chevrolet value.

Now, Chevrolet's two rugged valve-in-head engines give more power than ever. Advance design, solid construction and low prices give Chevrolet more value than ever.

Prove it to yourself. See the new Chevrolet P·L Trucks. Check them for popularity, performance, payload and price. In 1950 they are more than ever America's best truck buy!

CHEVROLET MOTOR DIVISION, *General Motors Corporation*, DETROIT 2, MICH.

LEADING WITH ALL THESE PLUS FEATURES:

• TWO GREAT VALVE-IN-HEAD ENGINES: the New 105-h.p. Load-Master and the Improved 92-h.p. Thrift-Master—to give you greater power per gallon, lower cost per load • THE NEW POWER-JET CARBURETOR: smoother, quicker acceleration response • DIAPHRAGM SPRING CLUTCH for easy action engagement • SYNCHRO-MESH TRANSMISSIONS for fast, smooth shifting • HYPOID REAR AXLES—5 times more durable than spiral bevel type • DOUBLE-ARTICULATED BRAKES—for complete driver control • WIDE-BASE WHEELS for increased tire mileage • ADVANCE-DESIGN STYLING with the "Cab that Breathes" • BALL-TYPE STEERING for easier handling • UNIT-DESIGN BODIES—precision built.

CHEVROLET

P*·L*

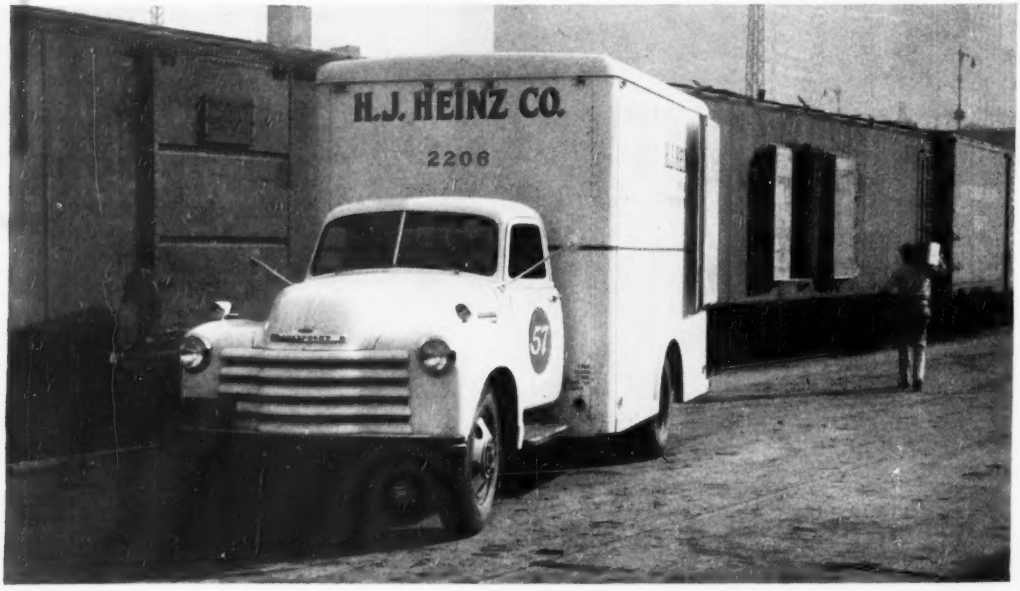
ADVANCE-DESIGN TRUCKS

P*opularity L*eaders
Chevrolet trucks outsell all others. In every postwar year truck users have bought more Chevrolets than any other make—*proof* of the owner satisfaction they have earned throughout the years.

P*erformance L*eaders
The new Chevrolet P•L trucks give you high pulling power over a wide range of usable road speeds—and on the straightaway, high acceleration to cut down total trip time.

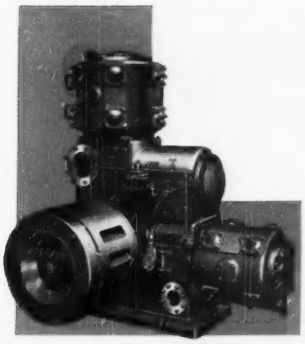
P*ayload L*eaders The rugged construction and all-around economy of Chevrolet P•L trucks cut operating and repair costs—let you deliver the goods with real reductions in cost per ton per mile.

P*rice L*eaders From low selling price to high resale value, you're money ahead with Chevrolet trucks. Chevrolet's rock-bottom initial cost—outstandingly low cost of operation and upkeep—and high trade-in value, all add up to the lowest price for you.

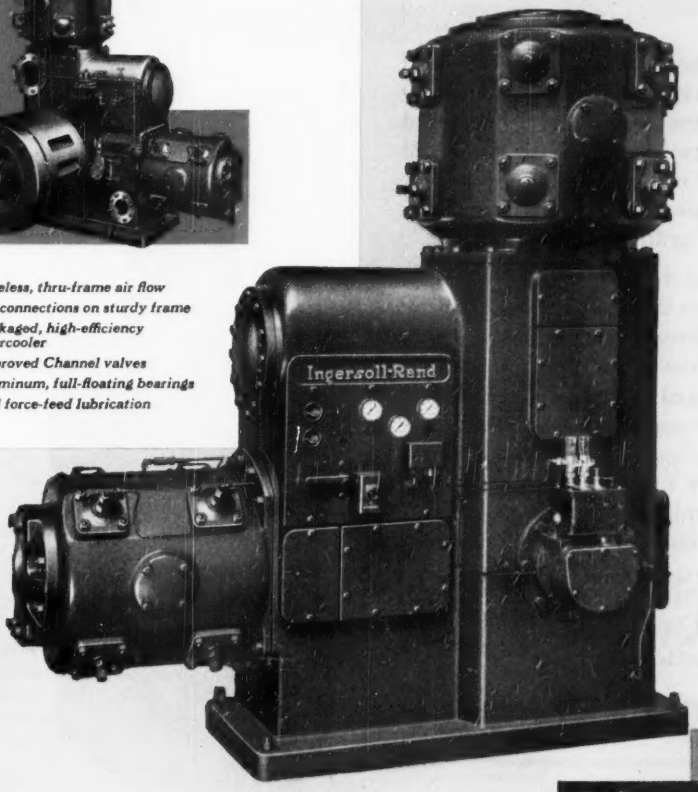


HERE'S A *NEW IDEA* IN ELECTRIC-DRIVEN AIR COMPRESSORS

. that means lower costs of Installation, Operation and Maintenance



- *Pipeless, thru-frame air flow*
- *Air connections on sturdy frame*
- *Packaged, high-efficiency intercooler*
- *Improved Channel valves*
- *Aluminum, full-floating bearings*
- *Full force-feed lubrication*



A Packaged
"L" DESIGN

THE SIMPLEST
MOST COMPACT
MOST ACCESSIBLE
MOST ECONOMICAL
READY-TO-RUN
HEAVY-DUTY
CROSSHEAD-TYPE

TWO-STAGE
80 to 125 psi

SIZES
125 to 350 hp

Ingersoll-Rand

XLE

507-1

The **XLE** incorporates a "new look" and a new idea in air-compressor design. It is a heavy-duty, well-balanced, easy-to-keep-clean machine that can be installed with an absolute minimum of effort, time, and cost . . . on a minimum of foundation.

Simplicity of **XLE** construction, and advanced-design features such as aluminum-alloy full-floating bearings that require no adjustments in a sealed, dust-tight crankcase, result in lower-cost maintenance and a higher degree of dependability.

The **XLE** is a highly efficient compressor built for continuous, full-load operation, and is ideal for factories, railroad shops, mines, powerhouses, and large construction jobs. It is particularly suitable wherever skid-mounting, factory floor, or ground conditions require a well-balanced machine.

FOR MORE INFORMATION on XLE Air Compressors, phone or write the Ingersoll-Rand office nearest you, or write . . .
INGERSOLL-RAND, 11 Broadway, New York 4, N. Y.

ROCK DRILLS • AIR & ELECTRIC TOOLS • OIL & GAS ENGINES • PUMPS • TURBO BLOWERS

YOU DON'T HAVE TO PAMPER

THE "King-clip" VALVE!

THIS STURDY IRON BODY GATE VALVE is built to stand the gaff of hard usage. It is a composite of the strong construction of the original "Clip" valve pioneered by Lunkenheimer many years ago and improved design features to meet modern-day conditions. It provides maximum resistance to distortion, piping stresses and wrenching strains.

Aside from its basic rugged proportions, the "KING-CLIP" embodies these distinctive features: • non-corrosive stem-thread bearing cast in bonnet • large drain channels that really drain the bonnet • sharply tapered bronze disc that seats tight • bronze rolled-in seat rings • coarse stuffing box threads that resist corrosion and stripping • hexagon head gland • Lunkenheimer-developed stem material that eliminates stem-thread failure due to wear • easy disassembly for servicing.

Ask for Circular No. 561 which illustrates the numerous patterns in which the "KING-CLIP" is available—iron body trim with bronze and various alloys, and all-iron . . . for a wide variety of services. You'll find one or more types which you can use to profitable advantage.

LUNKENHEIMER DISTRIBUTORS

save you money...and "headaches"!

Distributors' stocks and service are a money-saving and time-conserving convenience. The more you use these handy facilities, the less you need spend for stock-room inventory and "sleuthing" for sources of supply. Call your Lunkenheimer distributor and profit from his unfailing service—not only on valves, but on the numerous other commodities necessary to keep industry in pace with the needs of these fast-moving times.

ESTABLISHED 1862

THE LUNKENHEIMER CO.

"QUALITY"

CINCINNATI 14, OHIO, U.S.A.

NEW YORK 13 · CHICAGO 6 · BOSTON 10 · PHILADELPHIA 34

EXPORT DEPT. CINCINNATI 14, OHIO, U.S.A.

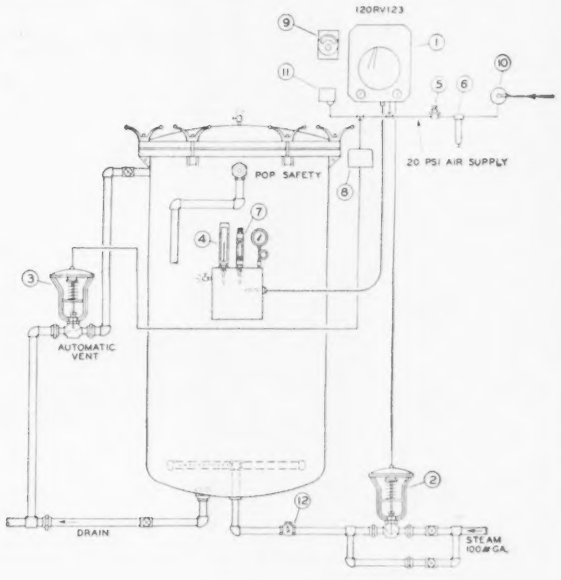
Fig. 1640

Iron Body Bronze Mounted "KING-CLIP" Gate Valve 150 lb. S.P.—200 lb. W.O.G. For steam, water, gas, air, oil and gasoline service.

The "King-clip" is king of all clip type valves!

NO DAMAGING AIR POCKETS

with Taylor's brand new Time and Temperature Venting Control



No. S-2V Steam Retort Control System
(For No. 2 cans and smaller)

FOR THE FIRST TIME in canning history, Taylor's new Automatic Time and Temperature Venting Control assures uniform venting of *each* retort load in accordance with NCA Research Bureau recommendations. Adequate venting eliminates air pockets from retort which, teamed with Taylor Time and Temperature Retort Control, assures uniform processing—load after load. Shown above is the Taylor S-2V Retort Control System for No. 2 cans or smaller (System SP-5TV is also available for No. 2½ cans or larger).

Without venting on a time-temperature basis, air pockets may form without showing up on your thermometers. Taylor's new venting control "sweeps" out such pockets, producing a uniform steam atmosphere inside the retort.

Typical NCA Research Bureau specifications, which Taylor Automatic Control meets to assure complete product sterilization, are: "One inch venting valve wide open for at least 5 minutes until temperature reaches at least 230°F.", or "for at least 7 minutes to at least 220°F."

This time and temperature venting system can either be added to your present retort control system, or furnished as part of a new system. Ask your Taylor Field Engineer for complete details on the Taylor Automatic Time and Temperature Venting Control best suited to your particular needs. You'll be surprised at the low cost. Taylor Instrument Companies, Rochester, N. Y., and Toronto, Canada. *Instruments for indicating, recording and controlling temperature, pressure, humidity, flow and liquid level.*

Taylor Instruments
MEAN
ACCURACY FIRST
IN HOME AND INDUSTRY

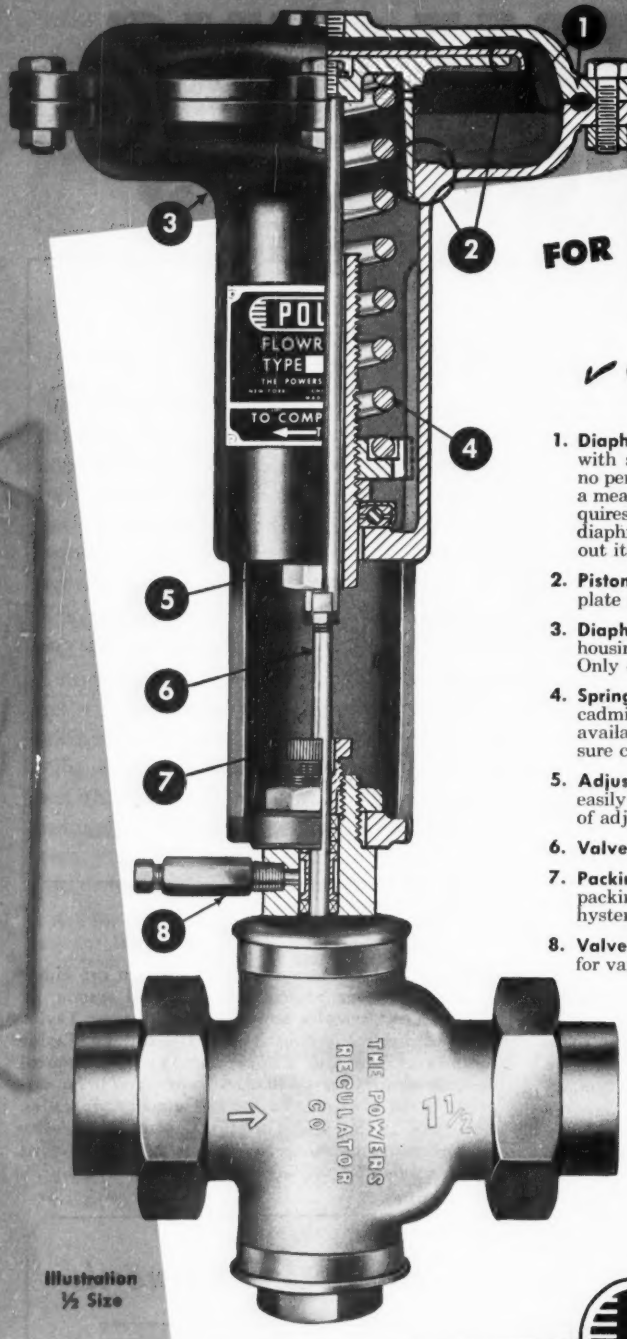


Illustration
½ Size

POWERS
FLOWRITE
VALVE

FOR BETTER CONTROL

✔ Check these Features of *NEW* POWERSTROKE TOP!

1. **Diaphragm**—Long life moulded Neoprene diaphragm with specially designed leak-proof sealing ring. Has no perforations or bolt holes. Diaphragm ring supplies a means for self-sealing under increasing pressure. Requires minimum of force for compression. Shape of diaphragm provides a constant effective area throughout its travel.
2. **Piston Plate**—Accurately guided self-aligning piston plate to eliminate side thrust.
3. **Diaphragm Housing**—Special high quality cast iron housing and top for ruggedness and corrosion resistance. Only 4 bolts are used to permit easy removal of top.
4. **Spring**—Enclosed special alloy steel calibrated spring, cadmium plated to prevent corrosion. Two spring rates available to give full valve travel in 5 or 10 lbs. pressure change in top.
5. **Adjusting Screw**—Ball bearing, non-rising type. Is easily accessible. Has 180° turning radius—wide range of adjustment.
6. **Valve Stem**—Polished stainless steel.
7. **Packing Gland**—Easily accessible, specially formed packing with metallic jacket for long life and low hysteresis.
8. **Valve Stem Lubricator**—Ball check type—lubricants for various conditions.

VALVES—Sizes: ½" thru 8". For line pressures up to 250 lbs. per square inch. Rugged construction to withstand piping strains.

VARIETY OF VALVE BODIES

Single seat or double seat, bronze and stainless steel trim. Double unions and flanged ends. Available normally open (direct acting) or normally closed (reverse acting) and 3-way mixing type valves.

POWERS

OVER 55 YEARS OF PNEUMATIC TEMPERATURE CONTROL—OFFICES IN OVER 50 CITIES

Complete Line of Controls for Heating and Air Conditioning Systems,

AND EXTRA YEARS OF DEPENDABLE SERVICE

POWERS

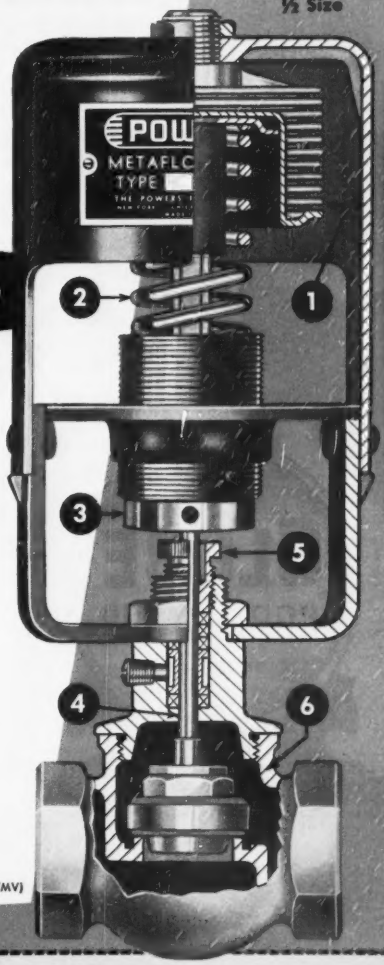
F and M AIR OPERATED CONTROL VALVES!

The Powers Regulator Co., pioneer in the development of the first all-pneumatic system of temperature control, now offers a new line of modern valves.

Check their many valuable features which can help you make important savings. Test and compare their superior performance with other valves. You'll find POWERS' valves moderately priced—often give more reliable operation over longer periods of time.

Contact our nearest office for further information or mail coupon below. THE POWERS REGULATOR CO., 2720 Greenview Avenue, Chicago 14, Ill. Offices in over 50 cities. Established in 1891.

Illustration ½ Size



(FMV)

Powers *Metaflow* Valves are small, sturdy, lightweight, reasonably priced, suitable for many control applications where space is limited and the pressure differential does not exceed 75 lbs. per square inch.

POWERS METAFLOW VALVE

SPECIFICATIONS

1. Housing and Bellows—Two sizes, 5″ and 8″ with specially formed brass bellows.

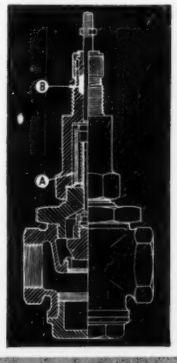
2. Spring—Cadmium plated. Calibrated to give full valve travel with 5 lbs. air pressure change.

3. Adjusting Screw—Brass, easily accessible. Has 15 lbs. adjustment range to give proper sequence operation where required.

4. Stem—Polished stainless steel.

5. Packing Gland—Specially formed packing with metallic jacket, grease sealed for long life and low hysteresis. Stem lubricator and variety of lubricants available as optional feature.

6. VALVES—Sizes: ½″ thru 2″; bronze bodies with screwed ends, maximum body pressure 125 lbs., rugged construction to withstand piping strains. **TRIM**—Composition disc with brass integral seat and self-aligning disc holder. Available normally open (direct acting) or normally closed (reverse acting), and three way.



METAFLOW PACKLESS VALVES

Prevent leakage of dangerous inflammable or harmful liquids or gases . . . . prevent waste and provide vacuum protection. Are suitable for use with Freon, oil, gasoline, non-corrosive gases, hot or cold water and low pressure steam. Have many uses in chemical plants, oil refineries, power plants, submarines and surface vessels.

Specifications: Direct acting valves (normally open); 125 lb. brass bodies, sizes ½″, ¾″, 1″, 1¼″; stainless steel seats and poppets; stem seal (A) is made of specially formed flexible brass bellows. Auxiliary packing gland (B) provides additional safeguard.

Water Heaters, and Industrial Processes

THE POWERS REGULATOR CO., 2793 Greenview, Chicago 14, Ill.
Send futher information and prices on POWERS
☐ FLOWRITE VALVE ☐ METAFLOW VALVE ☐ Packless Type
☐ Control Instrument for _____ (Process or Operation)
Name _____ Title _____
Address _____
City _____ State _____

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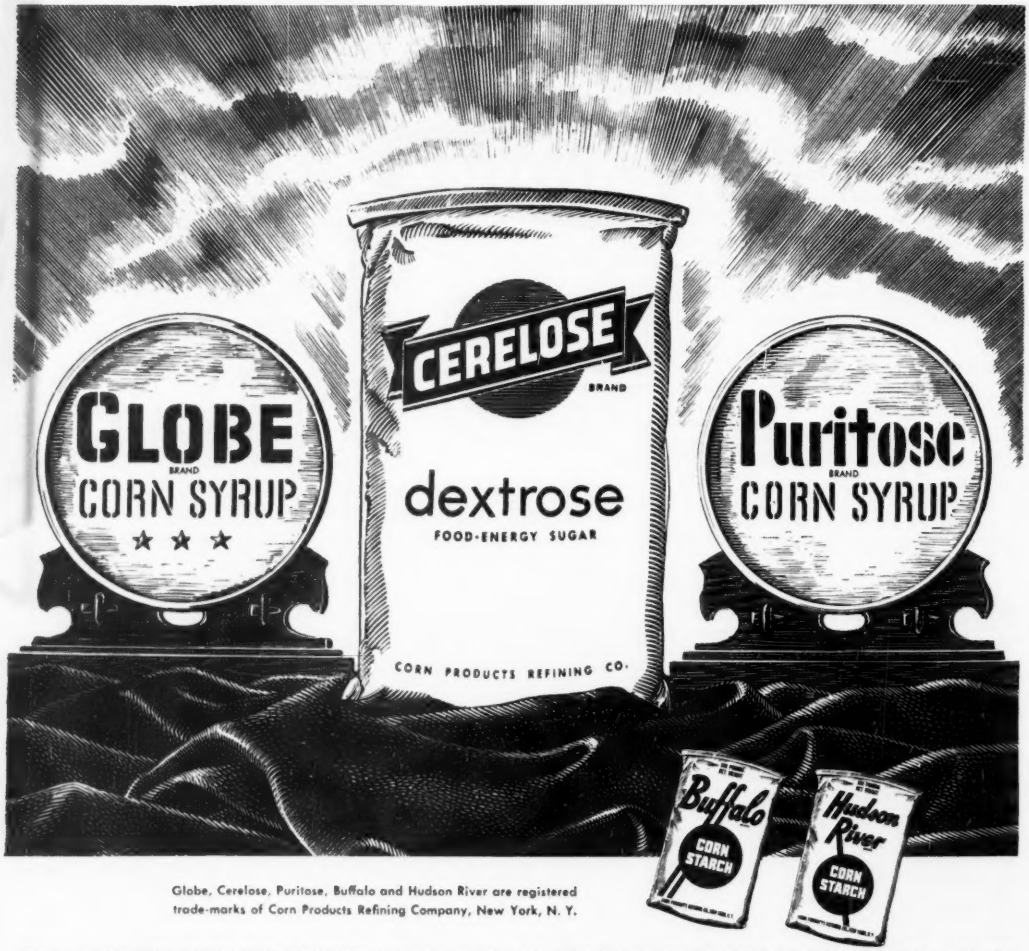
Technical and engineering services, to help you apply new methods, new products and new procedures in your production. On-the-spot studies can be made by highly skilled technical men ...no obligation to you. Just write Technical Service Department.



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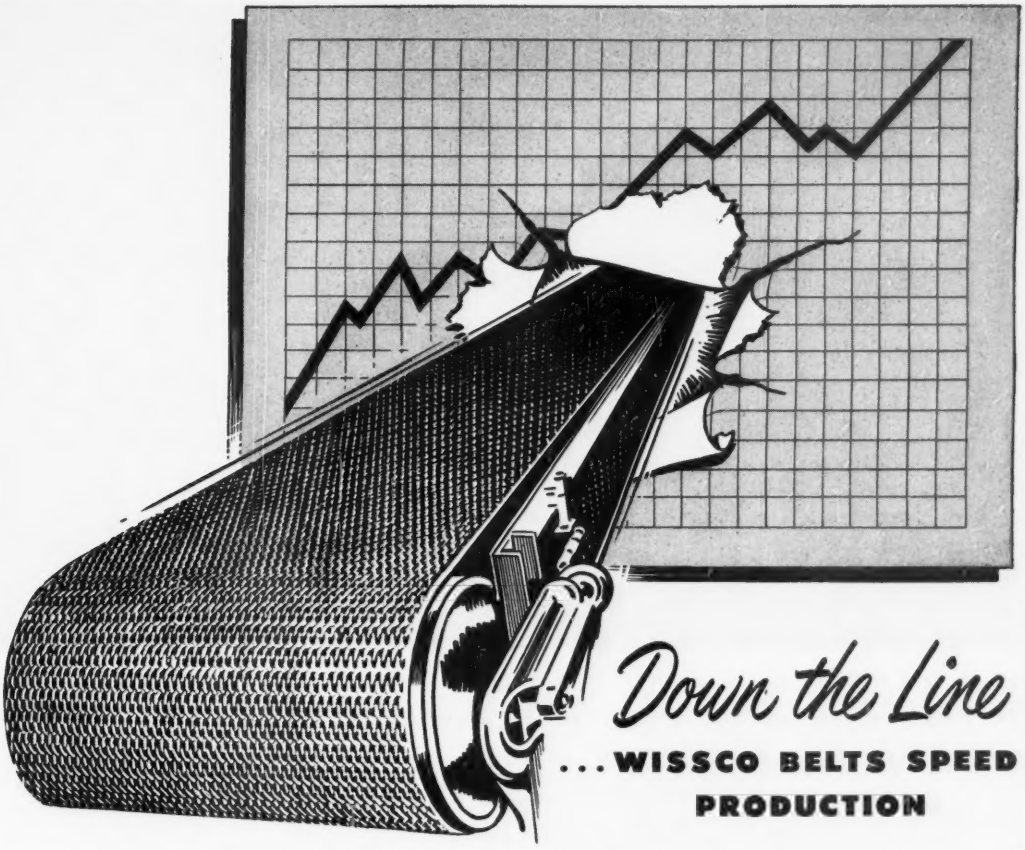

Down the Line

...WISSCO BELTS SPEED PRODUCTION

THOUSANDS OF MANUFACTURERS in scores of industries have found that Wissco Woven Wire Conveyor Belts speed production—cut costs. Time cycle, temperature and speed can be easily controlled and manual attention is reduced to minimum proportions.

Wissco Metal Conveyor Belts are the accepted standard for the heat treatment of metals, glass and ceramic ware and for processing of foods and other products. Whether your processing operation involves extremes in temperature, chemical action or other destructive factors, Wissco Belts are built to take it, for they are made of Monel, Stainless Steel, Bronze and other non-corrosive metals. They offer you these cost-cutting advantages:

Open Weave Construction—*Permitting free air circulation; free drainage.*

Extreme Flexibility—*Belts will operate over small diameter pulleys.*

Adaptability—*Built to withstand corrosion, abrasion, freezing or brazing temperatures.*

Simplicity of Design—*Easily made endless; readily repaired in case of accidental damage.*

Minimum Operating Costs—*Greatest load carrying capacity per unit weight and low thermal capacity mean fuel economy.*

Send for our illustrated booklet showing types and advantages of numerous conveyor belt constructions. And, if you have any questions on conveyor belts, their use and application . . . we will be happy to cooperate in solving your problem.

WISSCO METAL CONVEYOR BELTS ARE BEING USED IN:

Annealing Ovens, Baking Ovens, Brazing Furnaces, Canning, Ceramic Products, Chemical Processing, Decorating Glass, Dehydrating Food, Degreasing, Frozen Foods, Hardening Furnaces, Infra-Red Drying

WISSCO METAL CONVEYOR BELTS

A PRODUCT OF WICKWIRE SPENCER STEEL DIVISION OF THE COLORADO FUEL AND IRON CORPORATION

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Sales Offices—Boston • Buffalo • Chattanooga • Chicago • Detroit • Denver • New York • Philadelphia
Pacific Coast Subsidiary—The California Wire Cloth Corp., Oakland 6, California

here's low-cost mechanical power from process steam

If you use low-pressure steam for heating, drying or cooking, General Electric standard Type DP mechanical-drive turbines will give you mechanical power reliably, safely, at minimum cost!

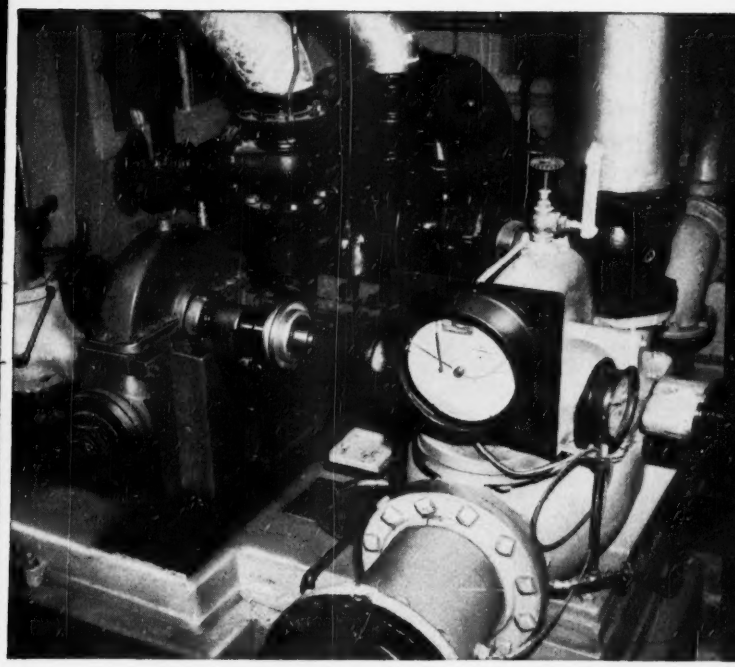
Mechanical-Drive TURBINES for FOOD PLANTS

Here's a way to produce food-plant power you just can't beat—use General Electric standard Type DP mechanical-drive turbines! They replace reducing valves to drop process steam down to utilization pressures and "skim off" only a small portion of the steam's heat, leaving the balance for process use. You get mechanical power as a by-product, at almost no cost!

These versatile G-E turbines pay off in many other ways for food plants. Depending only on the steam supply for their operation, they protect continuity of service against electric power failure, or serve as stand-by drives. Where existing electrical systems are overloaded and steam is available, they are an ideal choice. Direct-connected, they operate high-speed blowers and compressors without the need for step-up gears. They are readily adaptable to adjustable-speed applications and to automatic speed control. Finally, they can be installed in hot or damp locations, or in explosive atmospheres, without needing added protective equipment.

Most important, all the special features that make these advantages possible are included as standard equipment—at no extra cost. For more information on the advantages of the Type DP, send for Bulletin GEA-4955A, or contact your nearest G-E office. *Apparatus Dept., General Electric Company, Schenectady 5, N. Y.*

GENERAL ELECTRIC



Where can you use these versatile turbines?

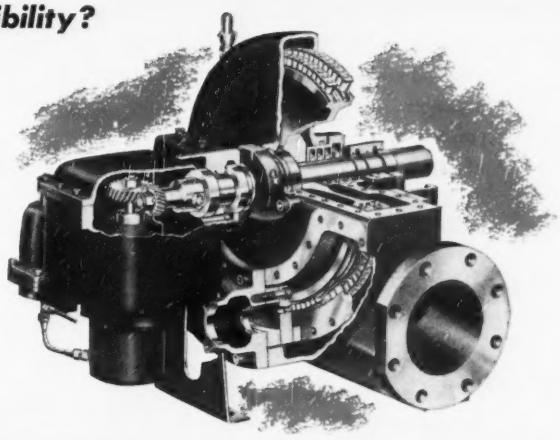
In this typical installation, a G-E Type DP mechanical-drive turbine, rated 30 hp, drives a centrifugal pump. Available in ratings from 10 to 1200 hp and in speeds from 1000 to 5000 rpm and higher, these drives have many other food-plant applications. Use them to drive compressors, grinders, blowers, separators, fans and other rotating equipment.

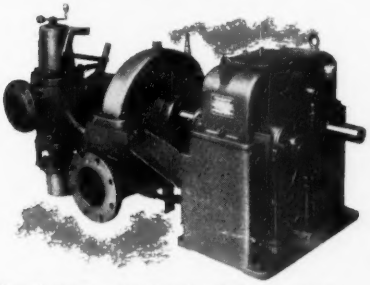
And How's This For Drive Flexibility?

With the Type DP turbine, re-location is easy when modernization calls for changes in your plant layout. Shaft height, size of coupling fit, and keyways are identical on all G-E standard, single-stage turbines. Center-line support permits quick alignment, saves installation time.

Speeds can be adjusted easily within a 30 per cent range, and once set, are held within 6 per cent accuracy by the hydraulic governing system. Speed range changes can be made by simply substituting a new emergency governor and a new set of gears on the governor drive.

Horsepower ratings can be increased, by means of a new nozzle plate and valve parts, to meet altered steam conditions or load demands. And for further flexibility, most of the replaceable parts are standardized and interchangeable.





Geared for low-speed savings! For conveyors, elevators and other food machinery to be driven at relatively low speeds, you can save additionally by using G-E Type DP turbines with close-coupled gear, as above. Compact and space-saving, these combined units are available in gear ratios up to 10 to 1.

WANT MORE DATA?

General Electric Company, Section 632-5
Apparatus Department, Schenectady 5, N. Y.

Please send me your bulletin GEA-4955A, which describes G-E standard Type DP mechanical-drive turbines.

Bulletin needed for: ☐ Reference purposes
☐ Planning immediate project

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Company.....

Street.....

City..... State.....

"PROTECTION is the FIRST function of PACKAGING"

Says

WILLIAM LONGYEAR

Designer for Commerce and Industry, and Chairman of the Department of Advertising Design (Packaging) at Pratt Institute.

Keeping the product sold... protecting all its qualities from factory to consumer ... is the first function of a good package. That's why the men who design sales-winning packages always stress the primary importance of product protection.

Check the sales leaders in field after field and you will find well-engineered packages . . . and over and over again, you will find a Riegel paper inside. Many other Riegel papers are designed for flexible packages, for laminates, for outer wraps and for almost every requirement in protective packaging . . . papers that can be relied on for smooth performance on modern high-speed machines.

Tell us your needs, and we believe we can offer you a paper that will do your job . . . efficiently and economically.

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342 Madison Avenue, New York 17, N.Y.

Riegel *Tailor-made Papers for Protective Packaging*

jams... jellies... preserves...

Look Better Taste Delicious

with PFIZER Citric or Tartaric Acid

Pfizer Citric or Tartaric Acids balance the sweetness of sugar and add a mouth-watering zest to jellies, jams and preserves that makes these delicacies hard to resist.

The ready solubility of Pfizer Acidulants will help you speed production—and their high quality and purity guarantee uniform acidulation from batch to batch.

Pfizer Citric and Tartaric Acids are available as the U.S.P. products. But Citric Acid is also available as the Anhydrous Acid—identical in purity with the U.S.P. but containing no water of crystallization. Write today for further information and prices. Chas. Pfizer & Co., Inc., 630 Flushing Avenue, Brooklyn 6, N. Y.; 425 North Michigan Avenue, Chicago 11, Ill.; 605 Third Street, San Francisco 7, Calif.

Other Pfizer Products for the Food Industry

SODIUM CITRATE U.S.P.
a buffer for the control of pH, an emulsifier for cheeses and to prevent feathering of cream.

CALCIUM CITRATE
firms pectin in tomatoes and apples, and is used in the preparation of alginate jellies.

CREAM OF TARTAR N.F.
for the prevention of crystallization of sugars by partial inversion

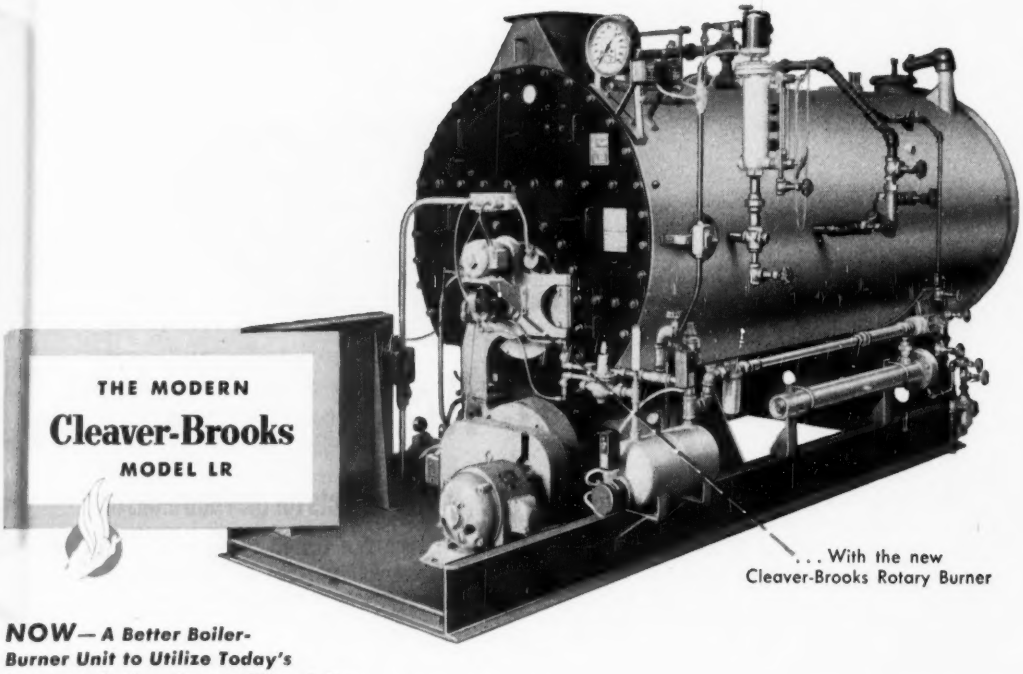
PFIZER

PFIZER QUALITY

Manufacturing Chemists for over 100 Years

Design

FOR PRODUCING STEAM



. . . With the new
Cleaver-Brooks Rotary Burner

NOW*— *A Better Boiler-Burner Unit to Utilize Today's Low-Cost Fuels — Heavy Oil and Gas

The Cleaver-Brooks Model LR is a "trail-blazer" in modern self-contained boiler design and construction. It makes more effective use of today's low-cost fuels, (heavy oils and gas), and you are assured of better boiler performance.

A Brief List of Notable Features:

— the new Cleaver-Brooks rotary burner — simple — compact — precision machined — perfect mechanical balance — fully automatic — provides unprecedented flexibility in burning heavy fuel oils or industrial gases.

— single low-speed, low-power consumption blower furnishes both primary and secondary air for combustion—less weight and space requirements — reduction in sound levels.

— totally enclosed, drip and dust-proof panel for all major electrical controls.

— electronic combustion safety devices, dual low water cutoffs — are standard equipment.

— simplified design of combination gas-oil burner permits change-over from oil to gas or vice versa in less than a minute.

— improved design of boiler furnace and liberal heating surfaces provide greatest economy with all fuels.

— boilers of all-welded construction — meet standards of A.S.M.E. boiler code and leading underwriters — burner approved by recognized national agencies.

The Cleaver-Brooks Model LR self-contained boilers are of a highly developed four-pass fire tube design — tested and proved by factory and field experience on several thousand boilers of this type.

Write for complete specifications, dimension data, firing rates.

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Now Ready: Bulletin SG 142 contains detailed data and description of the MODEL LR. Send for your copy today!

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2-Speed Truck
AXLES pay for Themselves Over and Over

Eaton 2-Speed Axles give your trucks added utility, improved performance, faster operating speed, more pulling power. They effect important savings in operating and maintenance costs. Eaton 2-Speed Axles provide the right gear ratio for road and load conditions. They permit engines to run in the most efficient and economical speed range, reduce stress and wear on vital vehicle parts and actually make trucks last longer. Eaton 2-Speed Truck Axles are available for most trucks of the 1 ½-ton class and larger. Ask your truck dealer how they will more than pay for themselves in your operation.

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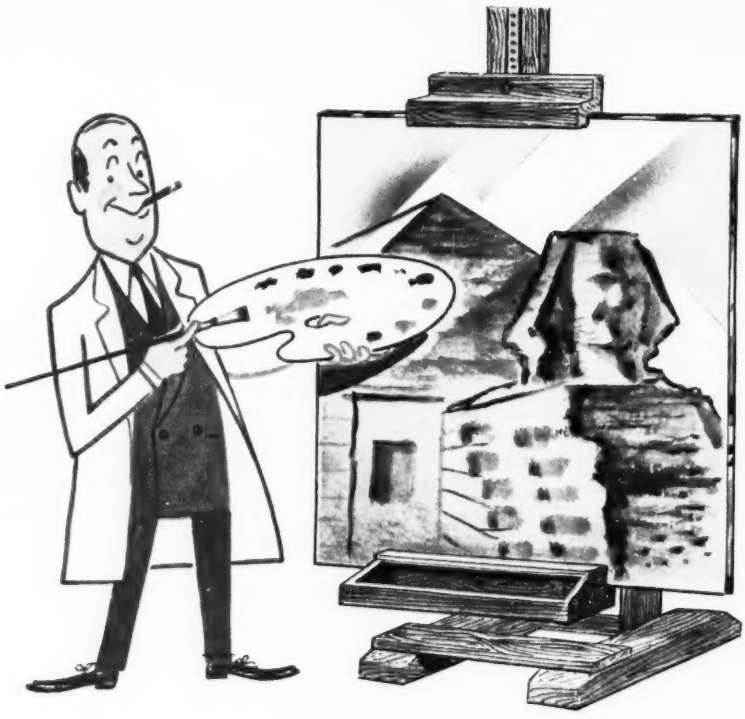

With ALLEGHENY METAL, you get something that *lasts*

Would you like a copy of STEEL HORIZONS?

It's a chatty, informal magazine, beautifully illustrated in full color. Stories on all the latest and most fascinating things other people are doing with special alloy steels. Good reading and perhaps many a valuable tip. No charge and no obligation (but reserved to business people, please).

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WHEN you spend money for anything, you want full value for it—right? Same way with folks who buy *your* products. Everyone wants to buy the most or the best for the money—the products that look best, last longest, give greatest satisfaction.

That's why Allegheny Metal—the pioneer stainless steel in America—has leaped into thousands of uses in the short space of a quarter-century. In everything from railroad trains to safety pins, and skyscrapers to birdcages, stainless steel today not only means "quality" to people, but actual *superiority* . . . the material that's best and cheapest in the long run.

If you're a builder of equipment, that fact can make money for you. Or, if you're a user of equipment, it can *save* you money. Let us help you to work it out.

ALLEGHENY LUDLUM STEEL CORPORATION
Pittsburgh, Pa.

Nation's Leading Producer of Stainless Steels in All Forms

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ALLEGHENY METAL is stocked by all Joseph T. Ryerson & Son, Inc. warehouses

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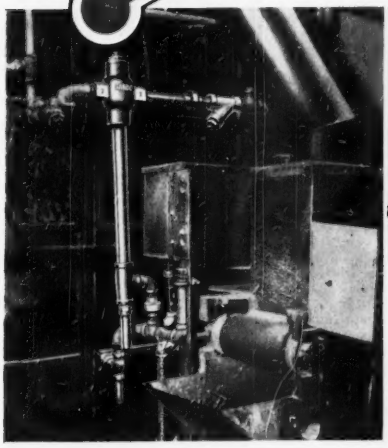

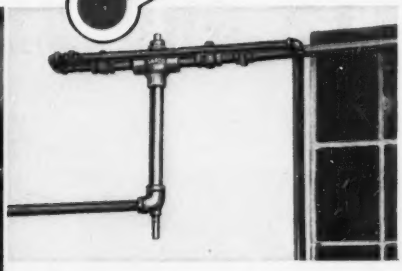

Because THERE'S ONLY ONE RIGHT TEMPERATURE FOR EACH JOB

When food materials come to the mixing and final processes, temperatures are critical—often to within a degree. But critical or not, these food processors found they could save sugar and flour by having the water exactly right at the last step—with a Sarco Water Blender.

In making syrup it's important to dissolve all the sugar for a better product—and lower cost. In macaroni, it's the art of getting the dough just right to go through the machines—without shut downs, rejected batches and wasted flour.

The Sarco Water Blender—a three way mixing valve operated by the famous Sarco bellows, goes into the line as easy as a T—and as quickly. It is not affected by normal changes in water temperatures or pressures. It costs little—very little considering what it does.

ASK FOR BULLETIN NOS. 700 AND 800

THE SARCO WATER BLENDER

is used extensively for process and wash water and gang showers. It also controls engine and compressor jacket water—protects the equipment, improves its efficiency and saves up to half the cooling water.

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IMPROVES PRODUCT QUALITY AND OUTPUT

For Better LYE PEELING of FRUITS and VEGETABLES

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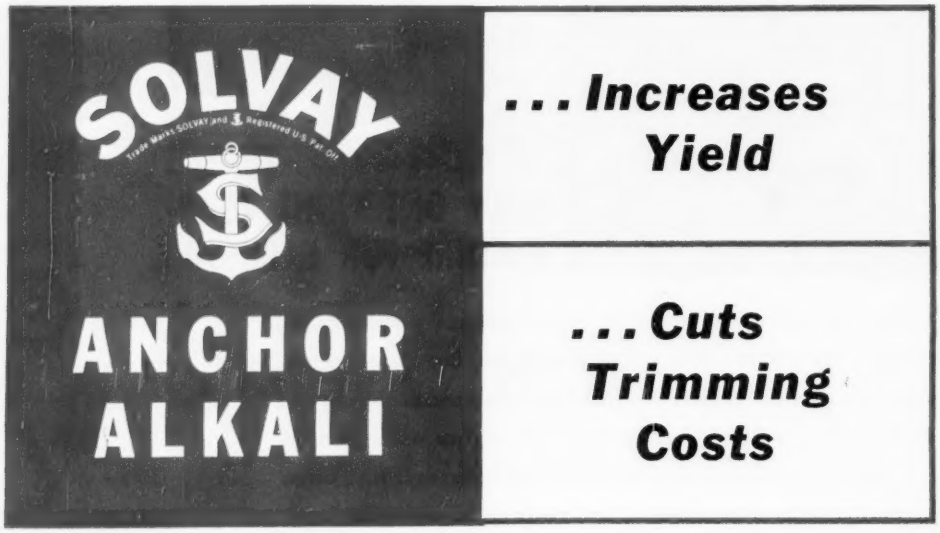

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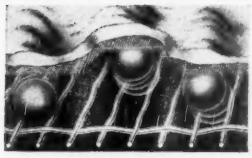
SIFT IT— CLEANER, FASTER MORE EFFICIENTLY WITH DAY RO-BALL

A DAY RO-BALL stabilized Gyrating Screen is a "must" for every modern plant. It means cleaner, faster, more efficient screening day-in and day-out. Check these advantages and see for yourself why DAY RO-BALL is first choice on thousands of progressive production lines:

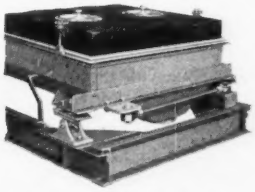


SUPER-ACTIVE BALL CLEANING DEVICE

The exclusive design of the Day ball-retainer screen provides scores of rebound points in each compartment. That means evenly distributed vibration over the entire screen . . . permits the use of finer mesh . . . keeps the mesh free and open for more efficient screening.

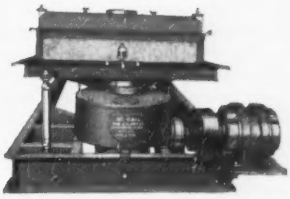
DUST-PROOF INSPECTION PORTS

Rim and cover are both cast aluminum. Precision-fitted to be positively dust-proof.



SELF-ALIGNING TAIL END BEARINGS, STABILIZING DRAG LINK

Slide-type bearings; base of cast iron and top bearing of graphite-impregnated plastic. Large-size for long life. Drag link with rubber blocks on both ends to maintain alignment, assure smooth operation; never need lubrication.



STABILIZER PREVENTS ROCKING

Larger size RO-BALL Sifters incorporate a stabilizer that maintains the horizontal position of the screen and prevents rocking. Both ends have rubber blocks for smooth operation; no lubrication needed.

See your J. H. Day Sales Engineer or write—
THE J. H. DAY CO., 1146 Harrison Ave., Cincinnati 22, Ohio for detailed literature

THE J. H. DAY COMPANY INCORPORATED • **CINCINNATI 22, OHIO**

FRUEHAUF TRAILERS CUT HAULING COSTS and the Savings are Passed On to YOU!

Fruehauf Stainless Steel Trailers deliver *both* raw materials and finished products for Shedd-BARTUSH FOODS, Inc., on a fast shuttle system between 6 of its major plants located throughout the east, south and southwest.

RAW MATERIALS VIA TRAILER

Shedd-BARTUSH FOODS cut cost of hauling raw materials—perishable food-stuffs—with these insulated Fruehaufs. *These savings are passed on to you!*

FINISHED PRODUCTS VIA TRAILER

Shedd-BARTUSH FOODS cut cost of hauling finished products—margarine, prune juice, dressings—with Fruehaufs. *These savings are passed on to you!*

Trailer transportation is a story of tremendous savings to American industry . . . savings on the fast, dependable delivery of nearly everything you eat, wear and use . . . *savings that are passed on to you* every day.

Everywhere, in over 100 different industries, users of Trailers find Fruehaufs the lowest-cost performers on *their* jobs. A multitude of different Fruehauf Trailer body types serve them night and day—bringing you *more* for *less*.

Find out how low-cost *Trailer* transportation may be applied to your business. Write for Fruehauf's free "Transportation Cost Analysis." Fruehauf Trailer Company . . . Detroit 32 . . . Los Angeles 58 . . . In Canada: Weston, Ont.

Trucks pay their share—*and more*—for their use of our highways. Although trucks make up only about 18% of all motor vehicles in the country, they pay over 32% of all motor vehicle taxes.

ONLY FRUEHAUF BUILDS STAINLESS STEELS

FRUEHAUFS HAUL BIGGER PAYLOADS — For comparable capacity, strength and durability, the new-type Stainless Steel is the lightest Trailer on the road! Carries up to 4000 lbs. more payload than conventional units.

FRUEHAUFS LAST LONGER— There is no record of a Stainless Steel Trailer ever having worn out. All the basic structural members are built of lighter, stronger, longer-lasting Stainless Steel.

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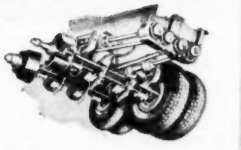

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Users of Fruehauf Gravity-Tandems report tire mileage up to 247,000 miles . . . fuel savings, too! No other Trailer costs less to operate—per day, per year.

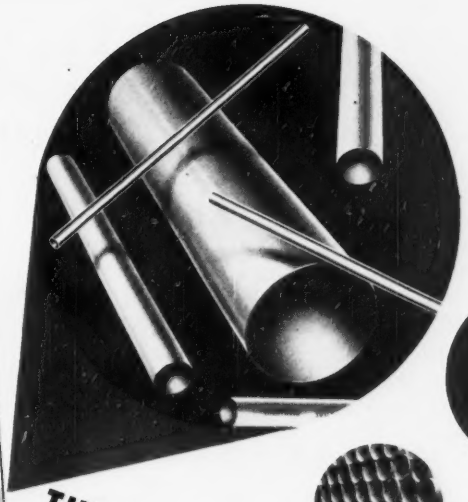
WORLD'S BEST SERVICE

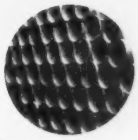
Fruehauf keeps Trailers rolling with a network of 80 Factory Service Branches, coast-to-coast. Every Branch can handle anything from regular maintenance to emergency repairs.

FRUEHAUF *Trailers*

WORLD'S LARGEST BUILDERS OF TRUCK-TRAILERS

WHICH TRENTWELD TUBING FITS YOUR NEEDS?





full finished tubing and pipe sizes

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ornamental tubing

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Whatever your industrial requirement . . . pressure tubing, stock line tubing, decorative tubing, cooling coils, sanitary beverage tubing . . . the complete TRENTWELD line of quality stainless and high alloy tubing is your best bet! TRENTWELD is made in a *tube* mill by *tube* engineers . . . and is designed for rugged dependability, long life and economical service.

Trent Tube Company *specializes* in the production of stainless and high alloy tubing . . . and that means you get expert advice on applying TRENTWELD to your needs. And you get fast service on delivery because of Trent's convenient mid-continent location. You're assured of finding what you need . . . the complete TRENTWELD line ranges from 1/8" to 30" diameter inclusive.

To meet your stainless or high alloy tubing requirements . . . better . . . TRY TRENTWELD! Write for TRENTWELD Data Bulletin.

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TRENTWELD

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DESIGNED BY NATURE

DESIGNED BY UNITED

The egg is a good example of nature's design and enginering. UNITED packages too are designed to fit your needs and requirements.

UNITED *Packages are:*

* *labor saving*	*set up quickly*
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WRITE, WIRE OR PHONE UNITED TODAY, WE ARE READY TO SHOW YOU WHY
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New AUTO-STOP METER

gives closer formula control and saves ingredients

Just push the buttons to set the quantity . . .

Flip the valve open and relax . . .

The Auto-Stop delivers the exact amount . . . automatically!

Wherever syrups, liquid sugars and cold, warm or hot water are fed into processing kettles, these new Neptune Auto-Stop liquid meters save ingredients, accurately control formulas, eliminate unsanitary conditions, and provide accurate cost figures.

Combining the famous Trident disc piston measuring chamber with the new Model 432 register, the meters are ideal for batching. Simply push buttons to set the quantity desired, open the valve, and the Auto-Stop will cut off the flow automatically at the right point. Has large numerals, attractive, easy-to-clean, dirt-proof housing. Measuring Chamber is bronze. In three sizes: 1", 1½" and 2".

For more quick information about this new profit-winning meter, just use the coupon below.

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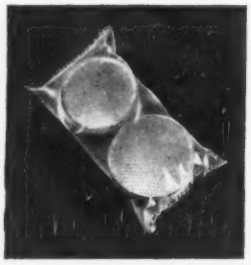
WIDE MOUTH SQUARE stock mold is functionally ideal for packaging heavy creams and ointments. Complete protection is afforded against accidents and rough handling. Size and shape make it right for luggage and storage in medical cabinets.

COMPLETELY SEALED, AIR-TIGHT and dust-tight, this Polyflex* salesman's sample display box gives desired rigidity, optical clarity, and eye appeal. Designed by Life Savers Corp. Fabricated by National Fabrilite Corp., New Haven. Polyflex* is low in cost.

HINDS HONEY & ALMOND FRAGRANCE CREAM in an 8-ounce Plaxpak bottle retails for 79 cents. Features emphasized are: "Easy to use — just tilt bottle and squeeze . . . built-in dispenser . . . unbreakable . . . refillable . . . and also economical."



DRYING OUT OF CHARCOAL in respirator cartridges is prevented by sealing them in a Plaxpak polyethylene bag. Low moisture transmission rate of Plaxpak film keeps cartridges "fresh" in storage. Film also keeps them hygienically clean.

NOW THE HOUSEWIFE has Plaxpak polyethylene film in rolls. From her own experience, she knows that products are better protected in Plaxpak. It's quite natural that she will have preference for those products because she will know they are packaged well.

FOR FILING OFFICE RECORDS Plaxpak Layflat tubing provides tough, age-resistant and transparent envelopes. File clerks snip off envelopes to size as needed from the roll of Layflat. Tubing is available in various widths.

★ In addition to its packaging products, Plax makes a wide variety of thermoplastics in rod, sheet, tube, and other forms.

Products that should stay dry do so in Plaxpak. Products that should stay moist — stay moist. The single-wall protection of the tough, moisture-resistant film means lighter, cleaner and more economical packaging. New stock Plaxpak bottles are available, too — including the Wide Mouth Square. For complete details on Plaxpak packaging products, write Plax.

PLAX BLOW-MOLDED PRODUCTS ARE MADE UNDER THE FOLLOWING U. S. PATENTS 2128239, 2175053, 2175054, 2230588, 2230590, 2260750, 2282375, 2349178, 2349177, 2349178. *TRADE MARK REG. U. S. PATENT OFFICE

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Stainless Steel "brings home the bacon" —with all its delicious flavor

AMERICA rolls out of bed with the stimulating aroma of sizzling bacon in the air . . . leaves for work fully awakened by its juicy-salty flavor.

TO BRING this taste treat through long processing lines with its inherent flavors and tastes intact, the meat packing industry relies heavily on Stainless Steel. Bacon slicing machines, among other equipment, are made of Stainless Steel because Stainless never imparts off-taste or off-color.

But packers don't confine the advantages of Stainless Steel to their bacon departments. From one end of the plant to the other, you'll find Stainless equipment protecting product flavor and purity and reducing costs. Corrosion-resisting Stainless makes every kind of equipment easier to clean and to keep clean. Its strength and resistance to hard usage extend equipment life. It is unaffected by meat acids, eliminating losses due to contamination.

Although the initial cost of Stainless equipment may sometimes be higher, these many advantages make it the most economical material in the long run.

You'll get the best possible performance and the greatest possible savings from Stainless equipment when it is fabricated from U·S·S Stainless Steel. U·S·S Stainless—available in the widest range of forms, compositions and finishes —is a perfected, service-tested material which gives years of satisfactory service even under the most severe conditions of food processing.

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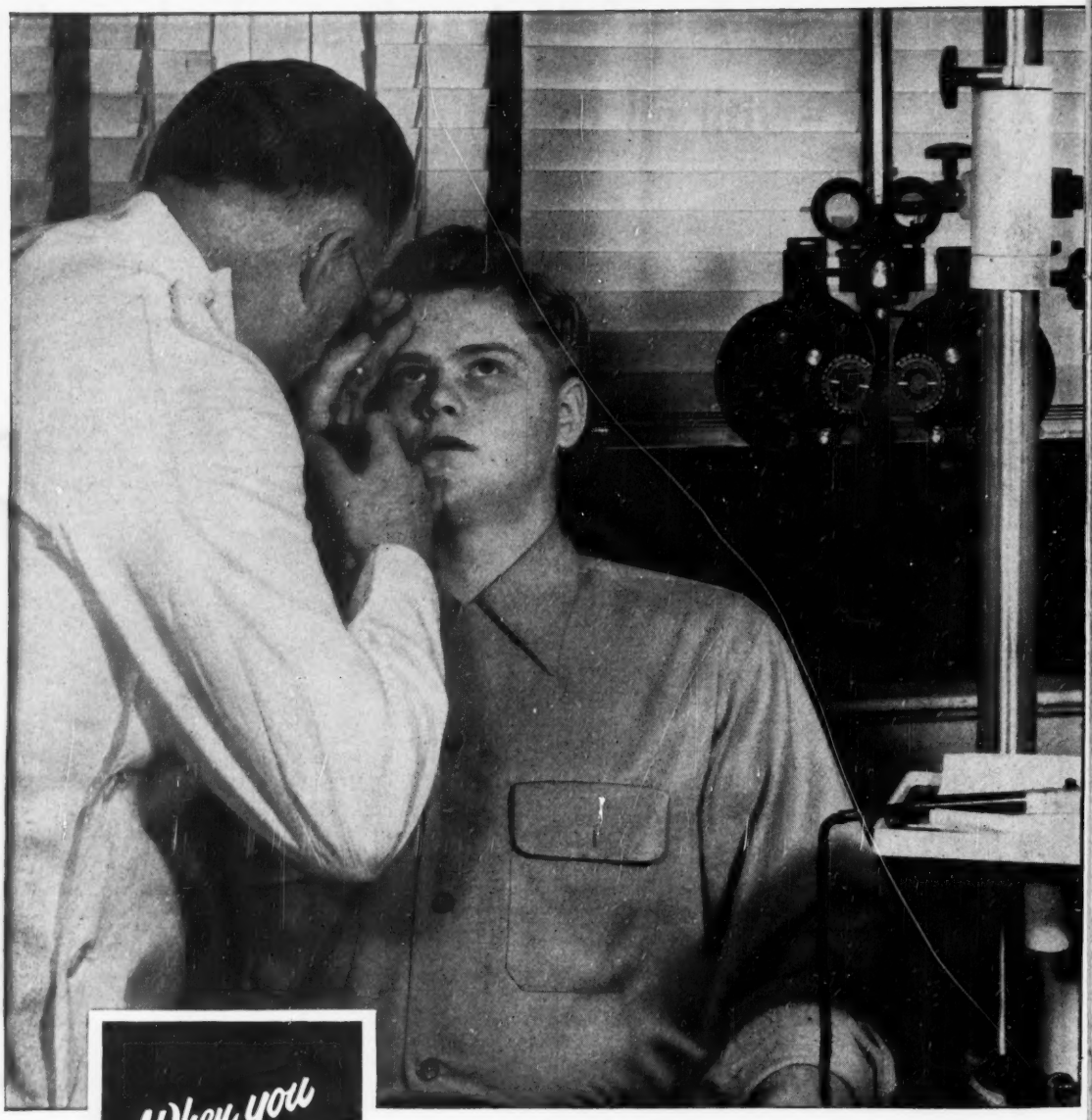
UNITED STATES STEEL



When you want the BEST go to the BEST

And for Packaging it's GLASS

The transparent glass package displays your products with all their colorful eye and appetite appeal. High in chemical durability, it does not change their taste or aroma, will not rust, corrode or leak. Easy to open, easy to use, easy to reseal to protect unused portions, it makes the most convenient package. It lends itself to individuality in size and shape, hence is adaptable to any product. Preferred by consumers because it is sanitary and convenient . . . by retailers because of its sales and merchandising advantages. Anchor Hocking Glass Corporation, Lancaster, Ohio.

Anchorglass*

PLAIN ROUND JARS

For packaging pickles or mayonnaise, fruits, vegetables and many other food products, standard *Anchorglass* Plain Round Jars are ideal. They are available in 26 capacities, from 4 oz. to 128 oz.—

Tough and sturdy, they are designed to move efficiently through every packing operation. Consistency in manufacture, uniform distribution of glass, accurate annealing, strict quality control from selection of raw materials to finished product—result in uniformly strong, light-weight containers. Regardless of what you pack, there is an *Anchorglass* container that will completely meet your requirements.

ANCHOR

AMERSEAL* CAPS

For dependable airtight, leakproof sealing of mayonnaise, salad dressings, syrups and many other food products not effected by bacterial decomposition use *Anchor* Amerseal Caps. Amerseals speed application—no matching or adjusting to threads is necessary—a quick quarter-turn seals. Your customers like this cap because a quarter-turn, a simple twist of the wrist, removes it. Knife-like action of the cap lugs easily breaks the contact. A reverse quarter-turn reseals time after time. Let us tell you more about the advantages and economies of *Anchor* Amerseal Caps and *Anchorglass* containers.

*Trade-Mark

For the BEST in Glass Packaging *it's*

ANCHOR HOCKING

"THE MOST FAMOUS NAME IN GLASS!"

don't get the wrong impression

It's easy to get the distorted idea that stainless steel is a "miracle metal," but after all, stainless is a *family of alloys,* and careful consideration must be given to the *right* analysis to use . . . or stainless won't live up to advance notices. Crucible, pioneers in the development of these specialty steels, makes freely available to you an alert metallurgical staff to help you put Crucible Stainless to work most efficiently in your application.

Crucible's half century of specialty steel leadership is based on a keen devotion to detail in every industry-posed problem. That's why Crucible built, from the ground up, one of the first integrated mills designed specifically for the hot and cold rolling of stainless steels. Take full advantage of Crucible's specialty steel experience. Call us in to work for you. CRUCIBLE STEEL COMPANY OF AMERICA, Chrysler Building, New York 17, N. Y.

CRUCIBLE first name in special purpose steels

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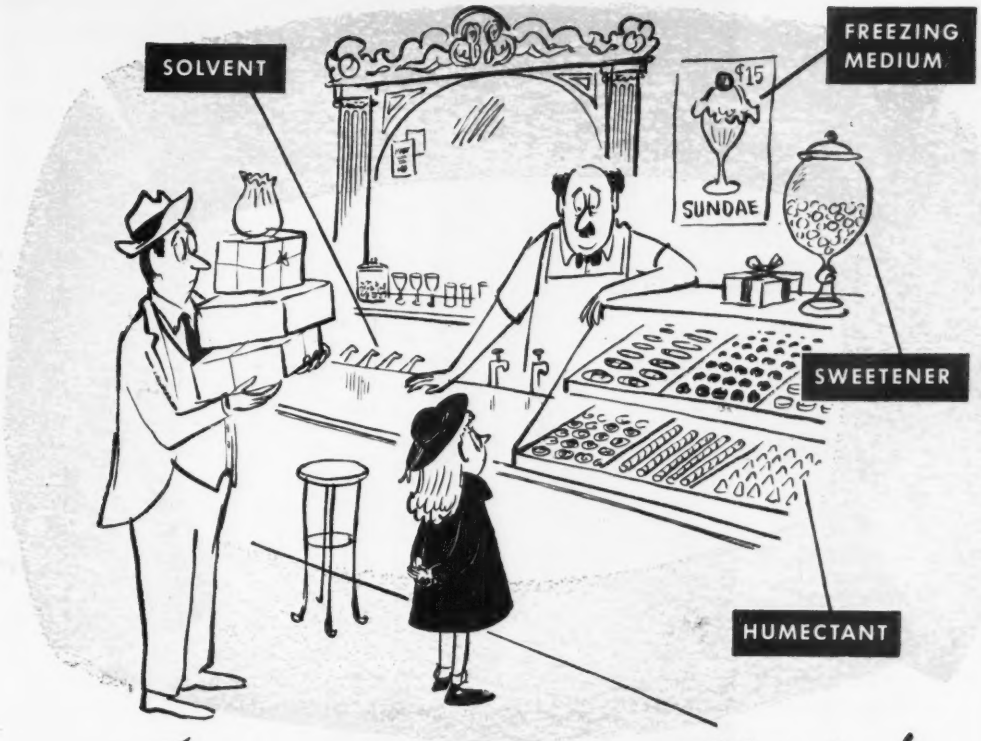
fifty years of Fine steelmaking

STAINLESS • HIGH SPEED • TOOL • ALLOY • MACHINERY • SPECIAL PURPOSE STEELS



If you value freshness... try Glycerine!

TODAY'S consumer—like this youngster—sets a high premium on *freshness* in foodstuffs! That's why U.S.P. Glycerine is called upon so frequently—to maintain freshness, good appearance, and palatability, and to prevent excessive drying, crumbling and graining in many food products. Then too, versatile Glycerine is an effective sweetener . . . a solvent in flavoring agents . . . a humectant in confectionery creams . . . and a non-toxic freezing medium—widely used in candies, ice cream and food staples! Whatever its application, U.S.P. Glycerine can be used with absolute confidence in food processing, because it is *safe*, edible, and actually nutritious when digested! Why not brush up on the role Glycerine plays in your business? The attached coupon will bring you a copy of "*Why Glycerine for Foods?*"—describing well-known Glycerine applications in a wide variety of food products.

TOMORROW—there's a bright future for U.S.P. Glycerine not only in the realm of food processing—but also in food packaging. It is already recognized as an essential plasticizer in the manufacture of sausage casings, wrapping materials, and the like—and every indication points to wider use of Glycerine for improving the properties of coatings applied to food containers. A recent paper describes a Glycerine-containing formula for producing a water-soluble varnish that's especially suitable for coating metallic surfaces of food containers. The resultant baked films are said to be definitely improved in moisture and heat resistance and freedom from tackiness as compared to films obtained from alcoholic solutions. Further details will be sent on request. (Please use your company letterhead.) Here's another good reason why—in food processing and food packaging—*nothing takes the place of Glycerine!*

Nothing takes the place of Glycerine

GLYCERINE PRODUCERS' ASSOCIATION
295 Madison Avenue, New York 17, N. Y.

PLEASE SEND A COPY OF 8

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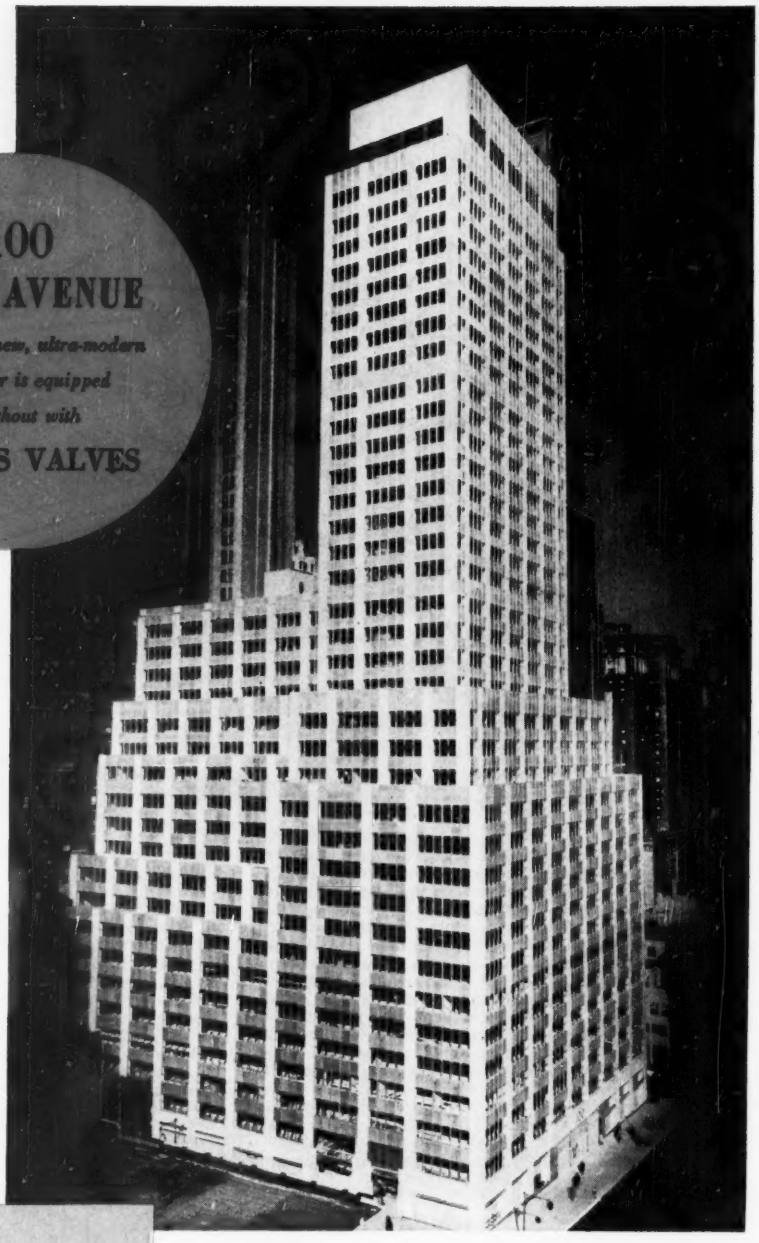
New York's new, ultra-modern skyscraper is equipped throughout with

JENKINS VALVES



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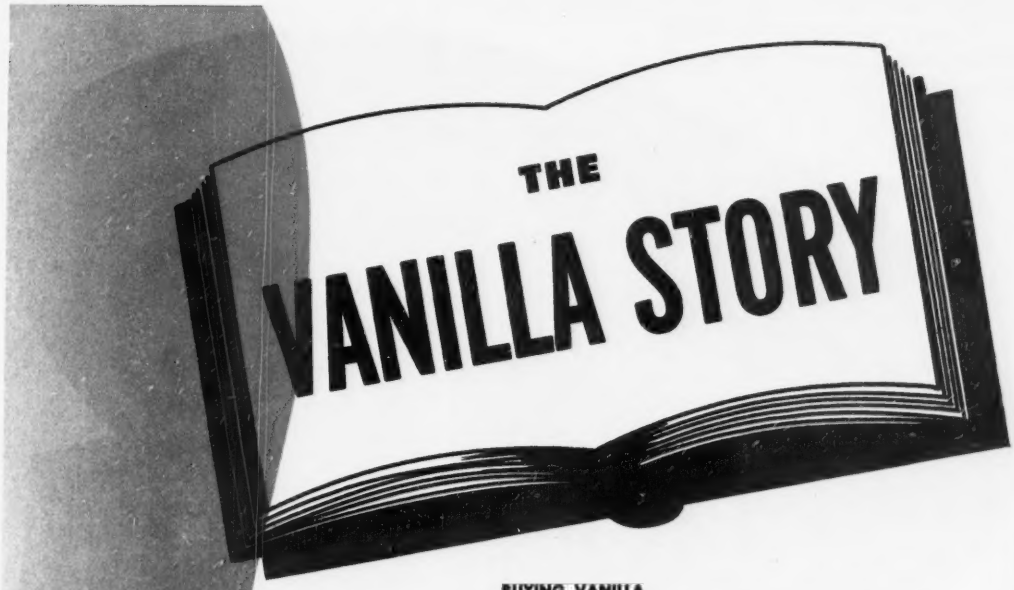
SINCE 1864 TRADE JENKINS MARK

Jenkins Bros.

4715 JENKINS VALVES! At 100 Park Avenue, as in all large buildings and plants, the many valves required represent a major investment. Obviously, maintenance costs would become excessive if valves proved inferior. That is why, today, when low-cost operation is a controlling factor in construction and modernization plans, so many builders take the long view of valve economy. They choose Jenkins Valves, for proved endurance. Despite their extra value, you pay no more for Jenkins Valves. *Sold through leading Industrial Distributors everywhere.* Jenkins Bros., 100 Park Avenue, New York 16: Jenkins Bros., Ltd., Montreal.



BUYING VANILLA
IS A CONFUSING JOB AND KNOWING WHAT YOU'RE GETTING IS EVEN MORE DIFFICULT.

Here's the Reason

The finest flavor is that of an old fashioned, leisurely extract of the best Mexican or Bourbon beans. Due to yield and time required, such extracts are seldom seen in today's market. To meet practical price requirements, economies are used, such as speedier and exhaustive extractions, cheaper grades and powdered beans . . . then for further savings, the imitations, using vanillin, other aromatics and even coumarin. Each has its flavor value yet each step carries flavor farther from true vanilla. In trying any vanilla, pure or imitation, compare it to the finest pure extract. Get the best you can afford.

ALVA can supply the finest as well as every other practical grade of vanilla for every use, honestly priced and honestly labeled. Here are a few:

- Pure Vanilla Extracts, single strength, 2, 4 and 10 fold
- Oleo Resin Pure Vanillas
- Imitation Vanillas
- **ALVANYA** (imit. vanilla absolute) duplicating the aromatic portion of the bean itself. Excellent when used alone or to improve any commercial vanilla at a saving. Extreme temperature stability.
- Vanilla sugars, pure and imitation.

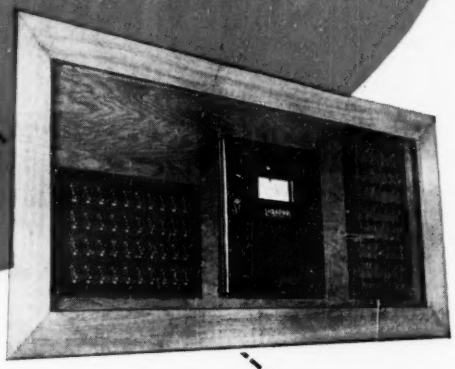
Tell us what you want and we will send you the best vanilla to meet your requirements.

VAN AMERINGEN-HAEBLER, INC.
521 WEST 57th STREET, NEW YORK 19, N. Y.

Alva FLAVORS

A WHOLE NEW CONCEPT OF INSTRUMENTATION
IS REVOLUTIONIZING THE FOOD INDUSTRY
FROM COAST TO COAST!

TEMPERATURE READINGS
at a moments notice
...WITH THE *ElectroniK* PRECISION INDICATOR
...KEEP GRAIN ELEVATORS
FROM GOING "DOWN"



KNOWING that heat can ruin rice by the binful, Mr. George Mouton of the Mouton Rice Milling Company in Harrisburg, Arkansas, is enthusiastic about his *ElectroniK* Temperature Indication System. It gives him an *accurate reading* for any section of any bin in the elevator, *at a moment's notice*. Stackburning and sour rice are plagues of the past. Drying time is economically planned. The *ElectroniK* Indicator Panel is located at a central point . . . instantly in touch with any temperature situation through a unique network of thermocouples.

This *ElectroniK* System is the new, modern way to check temperatures . . . it is fast and accurate . . . it requires a minimum of maintenance . . . and it is backed by a nation-wide service organization. Call in your local Honeywell engineer for detailed information . . . he is as near as your phone!

MINNEAPOLIS-HONEYWELL REGULATOR CO., *Industrial Division*, 4502 Wayne Avenue, Philadelphia 44, Pa. Offices in more than 80 principal cities of the United States, Canada and throughout the world.

COMMERCIAL • RESIDENTIAL • INDUSTRIAL
WORLD'S LARGEST ORGANIZATION FOR ADVANCED INSTRUMENTATION AND CONTROL

Creative instrumentation is the engineered application of cost-reducing instruments and controls.

MINNEAPOLIS
Honeywell
BROWN INSTRUMENTS
FOR THE FOOD INDUSTRY

SAME SUPERB PRODUCTS, but a new and more familiar name! To identify these oils as members of the Archer-Daniels-Midland family, and to avoid confusion with other products, we have changed the name of ADM's great new soybean salad and cooking oils from Supersoy to Archer "C" and Archer "S". Keep your eye on Archie the Chef—for pleasant news about finer foods!

TASTE 'EM . . . SMELL 'EM!

That's all the testing you will have to do, to realize that something really important happened when Archer-Daniels-Midland entered the field of edible soybean oils.

As the nation's largest processor of oilseeds, ADM brings to the food industries a wealth of laboratory research experience and know-how in the techniques of refining. That background, plus a splendid new refinery at Decatur, Illinois have already created tremendous interest in these new ADM products.

Both ARCHER "S", our salad oil, and ARCHER "C", our cooking oil, are refined, deodorized and winterized by continuous process. Passed through vacuum in the refining towers as a thin film, they are given a clarity of color, blandness, purity and uniformity that are simply not obtainable in batch processing.

Before you make any further decisions about soybean salad and cooking oils . . . *mail the coupon below.*

NOW . . . AMERICA'S FINEST EDIBLE SOYBEAN OILS ARE CALLED

Archer

SALAD AND COOKING OILS

● ORIGINALLY INTRODUCED AS **"Supersoy"**

Made at Decatur, Illinois by

ARCHER-DANIELS-MIDLAND CO.

HOME OFFICE MINNEAPOLIS, MINNESOTA

ARCHER-DANIELS-MIDLAND CO.
600 Roanoke Building • Minneapolis, Minnesota

● Please send sample of ☐Archer "S" Soybean Salad Oil ☐Archer "C" Soybean Cooking Oil

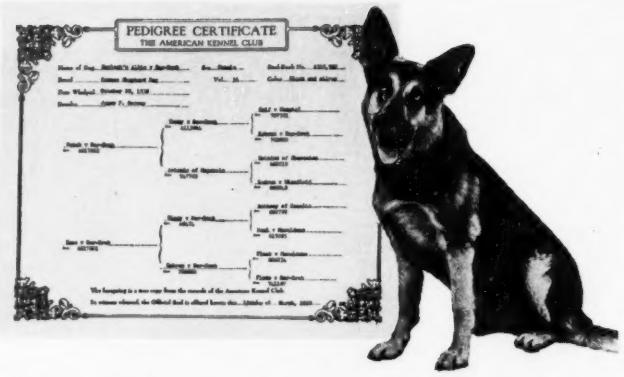
Name _____

Company _____

Address _____

City _____ *Zone* _____ *State* _____

THE SMOOTH-HAIRED GERMAN SHEPHERD is considered by many the king of the working dogs. He is loyal, suspicious of strangers, easily trained and has unusually keen senses of sight and smell. Average height of the breed is 24 inches.



To guard against shipping damage

Use the Box with the Pedigree

WHEN YOU ORDER boxes with a pedigree you can be *sure* the carload shipments you receive will measure up to the same high standards as submitted samples or previous shipment.

That's why Gulf Oil Corporation relies on Union boxes to protect its cans of famous Gulf Oil from refinery to service stations all over the country.

Every month more makers of famous brand products are shipping in Union boxes.

TRADE MARK UNION

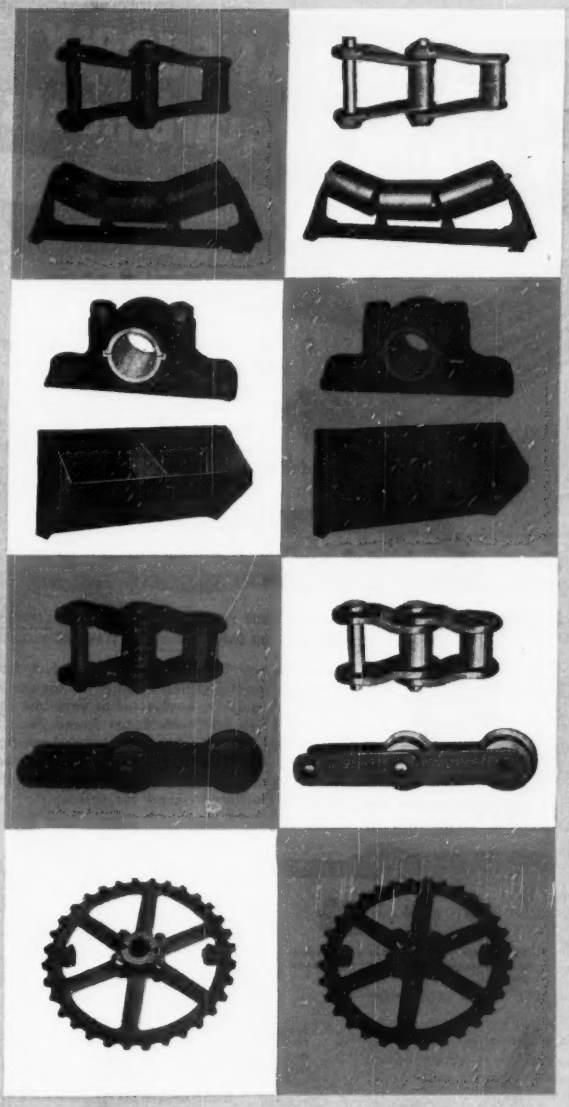
Dependable Packaging Since 1872

UNION Corrugated Containers

UNION BAG & Paper Corporation

Principal Offices: WOOLWORTH BLDG., NEW YORK 7, N. Y.

***Corrugated Container Plants:* SAVANNAH, GEORGIA • CHICAGO, ILLINOIS • TRENTON, NEW JERSEY**



JEFFREY REPLACEMENT PARTS ARE *Exactly* LIKE ORIGINAL EQUIPMENT

Put them side by side . . . they look alike. Put a new one in place of the old . . . they fit . . . they act alike . . . they ARE duplicates.

When normal wear necessitates replacement, be sure to specify Jeffrey parts. They are made to exact specifications, possess the same high quality of original equipment, plus many new improvements which Jeffrey engineers and metallurgists have developed in the meantime.

THE JEFFREY MANUFACTURING COMPANY

927 North Fourth St., Columbus 16, Ohio

ESTABLISHED 1877

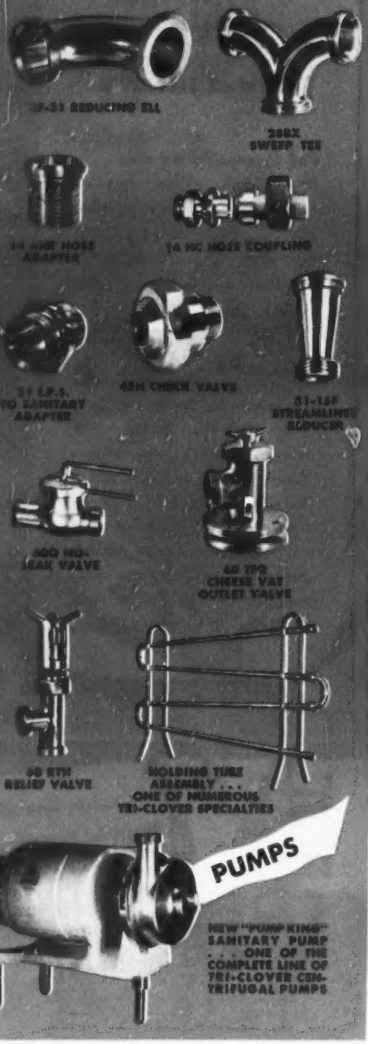
Complete Line of Material Handling, Processing and Mining Equipment

Baltimore 1 · Buffalo 2 · Cleveland 13 · Huntington 19 · Jacksonville 2 · Pittsburgh 22
Birmingham 3 · Chicago 1 · Denver 2 · Houston 2 · Milwaukee 11 · St. Louis 1
Boston 16 · Cincinnati 2 · Detroit 13 · Huntington 19 · New York 7 · Salt Lake City 1
Philadelphia 3 · Scranton 3

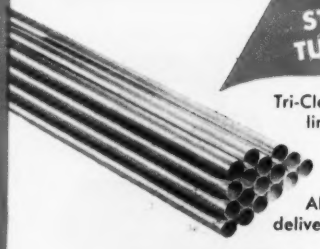
Here's your ONE SOURCE of SUPPLY for ALL Sanitary Piping Requirements

The COMPLETE Line of 3A STANDARD SANITARY FITTINGS — VALVES

(Tri-Clover offers many exclusive additions to this line . . . some of which are included below)


37-31 REDUCING ELL
288X SWEEP TEE
14 MC HOSE ADAPTER
14 MC HOSE COUPLING
31 I.P.S. TO SANITARY ADAPTER
45H CHECK VALVE
31-15F STREAMLINE REDUCER
600 NO-LEAK VALVE
60 TPO CHEESE VAT OUTLET VALVE
60 STH RELIEF VALVE
HOLDING TUBE ASSEMBLY . . . ONE OF NUMEROUS TRI-CLOVER SPECIALTIES
PUMPS
NEW "PUMP KING" SANITARY PUMP . . . ONE OF THE COMPLETE LINE OF TRI-CLOVER CENTRIFUGAL PUMPS

STAINLESS STEEL TUBING AND PIPE



Tri-Clover now offers the most complete line of stainless steel tubing and pipe, in all popular stainless analyses, and in a full size range, polished or unpolished. All types available on "out of stock" delivery basis.

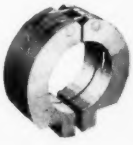
SUPER SPEED Tools

Vise and Expansion Blocks . . . hold Ferrules securely for expansion and facing of tubing.

ASSEMBLE YOUR SANITARY LINES WITH THE EXPANDED METHOD . . . THE ONLY APPROVED 3A STANDARD ASSEMBLY

Costly, messy leakage of your product from worn, improperly seated sanitary fittings can be eliminated quickly, easily and at very low cost . . . by using Tri-Clover *Super Speed* Tools to service all sanitary lines. Features: Leak-tight joints . . . 60% faster, easier installation and maintenance . . . longer fitting life. (Partial line of tools illustrated—send for catalog.)

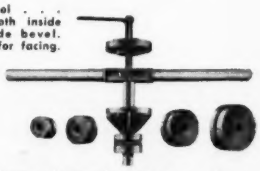
Torqometer . . . Provides easy expansion, through predetermined inch-pound pressure.



Sawing Vise . . . used in common bench vise to secure fast, accurate tubing cuts.

Expanders . . . Simple, efficient tools for accurate expansion, even with inexperienced personnel.

Seating Tool . . . Provides both inside and outside bevel. Also used for facing.



EXPORT DIVISION — 8 So. Michigan, Chicago 3, U. S. A.

Tri-Clover MACHINE CO.

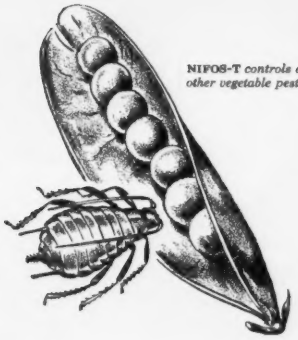
Kenosha, Wisconsin

TRIALLOY AND STAINLESS STEEL SANITARY FITTINGS, VALVES, PUMPS, TUBING, SPECIALTIES

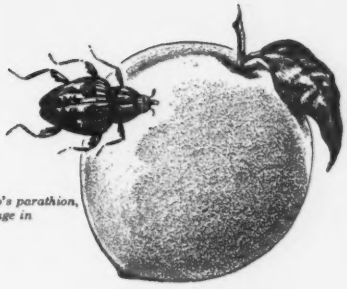
TRI-CLOVER

FABRICATED STAINLESS STEEL INDUSTRIAL FITTINGS AND INDUSTRIAL PUMPS

THE *Complete* LINE



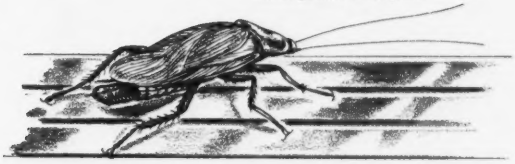
NIFOS-T *controls aphids and other vegetable pests.*



NIRAN, *Monsanto's parathion, checks insect damage in many fruits.*

COMPOUND 1080, *most powerful of all rodenticides. Extremely poisonous. Can be used in the food industry only in accordance with federal government regulations.*

SANTOBANE *kills many on-the-premise insect pests.*



Monsanto Chemicals help food industry get rid of costly weeds and insects

From the time crops pop out of the ground until foods are processed, weeds and insects threaten your production and quality. It's profitable for you to get rid of pests, and this long list of Monsanto Chemicals will help you do it:

MONSANTO HERBICIDAL CHEMICALS

2,4-D ACID • 2,4-D SODIUM SALT • 2,4-D ISOPROPYL ESTER • 2,4,5-T ACID • 2,4,5-T ISOPROPYL ESTER • SANTOBRITE* (Sodium Pentachlorophenate, Tech.) • SANTOPHEN* 20 (Pentachlorophenol, Tech.)

MONSANTO INSECTICIDAL CHEMICALS

ortho-DICHLOROBENZENE (Commercial Grade) • SANTOBANE* (DDT) • SANTOCHLOR* (*para*-Dichlorobenzene) • SANTOPHEN 20 (Pentachlorophenol, Tech.) • TRICHLOROBENZENE, Technical • NIFOS*-T (Tetraethyl Pyrophosphate, Tech. For agricultural use only) • NIRAN* (Parathion. For agricultural use only)

MONSANTO RODENTICIDE — Compound 1080*

Specify Monsanto Chemicals and be *sure* of quality. For herbicides and insecticides, see your formulator or custom sprayer. To get rid of on-the-premise pests, see a qualified pest control operator. For information on any Monsanto Product, mail the coupon or contact the nearest Monsanto Sales Office. MONSANTO CHEMICAL COMPANY, Organic Chemicals Division, 1737-C South Second St., St. Louis 4, Mo.

DISTRICT SALES OFFICES: Birmingham, Boston Charlotte, Chicago, Cincinnati, Cleveland, Detroit, Houston, Los Angeles, New York, Philadelphia, Portland, Ore., San Francisco, Seattle. In Canada, Monsanto (Canada) Ltd., Montreal.

**Reg. U. S. Pat. Off.*

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Organic Chemicals Division
1737-C South Second Street, St. Louis 4, Missouri

Please send information on.....

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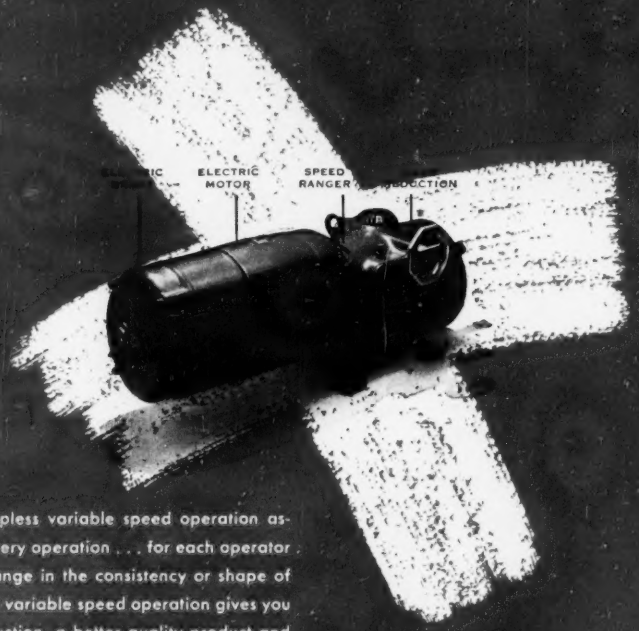
Name.....*Title*.....

Company.....

Street.....

City.....*Zone*.....*State*.....

SERVING INDUSTRY . . . WHICH SERVES MANKIND



On thousands of applications, stepless variable speed operation assures exactly the right speed for every operation . . . for each operator . . . the right speeds for each change in the consistency or shape of the material being processed. Such variable speed operation gives you plus value in higher rates of production, a better quality product and more efficient performance of your equipment and your operators.

Master Speedrangers provide this infinitely variable speed in compact, all-metal, mechanical variable speed units in a wide range of types and in sizes up to 5 horsepower.

variable speed operation offers you PLUS VALUE

For example, see how the Speedranger on this machine incorporates an electric motor, a variable speed unit, a gear reduction unit and an electric brake . . . all standard Master units that easily combine into a compact, integral power package. This provides exactly the RIGHT horsepower, the RIGHT range of speed, the RIGHT features, in a unit that you can use RIGHT where you want it.

Write for Data 7525, a new 24-page book on Speedrangers, and see what a real job they can do for you.

THE MASTER ELECTRIC COMPANY • DAYTON 1, OHIO

MASTER SPEEDRANGERS

TIME

...to get them on your side

PEOPLE WHO SELL THE MOST FOOD

. . . to food stores, institutions, and other large-volume buyers.

PEOPLE WHO INFLUENCE WHOLESALE FOOD PURCHASES

. . . officials of large food-consuming establishments.

PEOPLE WHO BUY THE MOST FROM FOOD STORES

. . . the country's higher-income families.

TO GET THEM ON YOUR SIDE, REACH THEM IN THEIR OWN FIRST-CHOICE MAGAZINE.

FINAL FIGURES FROM SURVEY OF LEADING U.S. FOOD WHOLESALERS ... TWO QUESTIONS ASKED..

"WHAT MAGAZINES DO YOU READ REGULARLY."

"WHAT ARE YOUR FIRST AND SECOND CHOICE MAGAZINES."

45.7 PER CENT OF THIS IMPORTANT FOOD-SELLING GROUP READ TIME REGULARLY... TIME GETS MORE "FIRST CHOICE" VOTES THAN ANY OTHER MAGAZINE.

1373 LEADING HOTEL EXECUTIVES, 937 HOSPITAL SUPERINTENDENTS ALSO VOTE TIME "FIRST CHOICE" MAGAZINE ABOVE ALL OTHERS. TIME SECOND ONLY TO LIFE IN REGULAR READERSHIP.

/ MORE COMING/

SAME QUESTIONS ASKED BEST CUSTOMERS OF FOOD STORES IN BALTIMORE ... RIVER FOREST, ILL... QUINCY, MASS ..... ANSWERS UNIFORM --

// TIME IS "FIRST CHOICE" MAGAZINE//

GOVERNMENT FIGURES SHOW -

FAMILIES IN TIME INCOME BRACKET

SPEND 62 PER CENT MORE FOR FOOD

THAN AVERAGE U. S. FAMILY.

MORE FACTS COMING IN THIS SPACE NEXT MONTH. FOR ADVANCE INFORMATION ON YOUR BEST CUSTOMERS, WRITE..

THOMAS E. RYAN, TIME RESEARCH

9 ROCKEFELLER PLAZA, NEW YORK 20, N. Y.

TIME
MARKET RESEARCH
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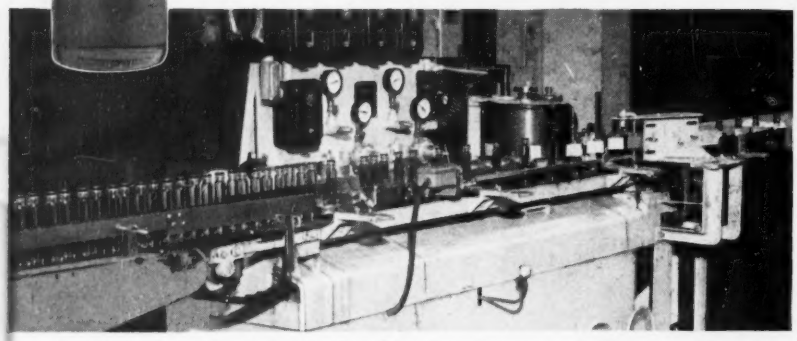
TIME

THE WEEKLY NEWSMAGAZINE

For Bonoil Packing Corp.

PERVENAC* LABELING

Gives Both!



A Fast, Neat Labeling Operation Here!

With Pervenac and a more centralized labeling operation, this Brooklyn, N. Y. importer of olive oil is now obtaining labeling speed that would have seemed incredible a few years back — plus a minimum of rejects and no shut down for glue clean up. Pervenac's a *natural* for this shapely, smartly-designed bottle because it's the heat seal paper that won't drop off, won't develop "dog ears", won't wrinkle, won't smear.

Eye-Appeal that Builds Sales Here!

Pervenac labels spur the urge to buy of the impulse shopper. Always neat, they reflect the quality of the product. Sales go up because label edges stay *down* and *untorn,* are positioned on bottle after bottle with bulls-eye accuracy. Many packers believe in switching to Pervenac before their customers do! Tell us or your nearest distributor your requirements and remember Pervenac works on glass (curved or flat, wet or dry), film, metal or paper.

*Trade Mark
Manufactured under patent 2,462,029

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MAKES PAPER MAKE MONEY FOR YOU

NASHUA GUMMED AND COATED PAPER COMPANY
NASHUA, NEW HAMPSHIRE

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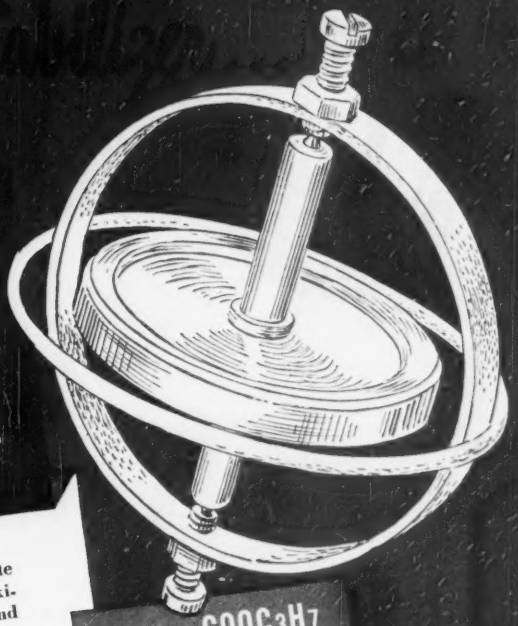
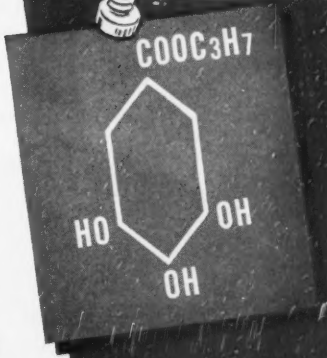
MEXICO, CENTRAL AMERICA, SO. AMERICA, SO. AFRICA, and the FAR EAST
American Paper Exports, Inc., New York City
UNITED KINGDOM, EUROPE, NO. AFRICA and the NEAR EAST
I. J. Saper, 65 Ave. Niel, Paris

A Highly Effective Stabilizer...

PROPYL GALLATE



Heyden Propyl Gallate is a purified form of n-propyl gallate (propyl 3,4,5-trihydroxybenzoate). It is a powerful antioxidant serving effectively as a stabilizer for edible oils and fats, ethers, emulsions, waxes and other materials subject to deterioration or auto-oxidation through formation of peroxides. It is active in very low concentrations and protects color, odor and taste of the finished product. It is non-toxic in the amounts commonly used.



PROPERTIES

Appearance	Ivory, fine powder
Odor	Odorless
Taste	Tasteless in 0.01% solution
Melting Point	147°—149°C.
Solubility (g. per 100 g. solvent)	
Water at 25°C.	0.35
Water at 50°C.	1.8
Ethanol at 25°C.	103
Ether at 25°C.	83
Glycerol at 25°C.	25
Propylene Glycol at 25°C.	67
Cottonseed Oil at 30°C.	1.23
Lard at 45°C.	1.14

• • •

Shipped in 200, 100, 50 and 25 lb. fiber drums. Detailed technical data sheet will be mailed promptly upon request on company letterhead.

Serving Industry . . .
through Finer Chemicals

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CHEMICAL CORPORATION

FINE HEYDEN CHEMICALS

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WINNING TEN awards in the 1950 Carton Competition sponsored by the Folding Paper Box Association of America, is an outstanding achievement... a truly dramatic demonstration of GAIR technical skill in the art of creating, designing and producing folding cartons.

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GAIR is extremely proud of capturing these coveted laurels. Yes, proud of every element of "know-how" that entered into this outstanding accomplishment. It was a typical result of GAIR folding carton facilities and skillful team-work.

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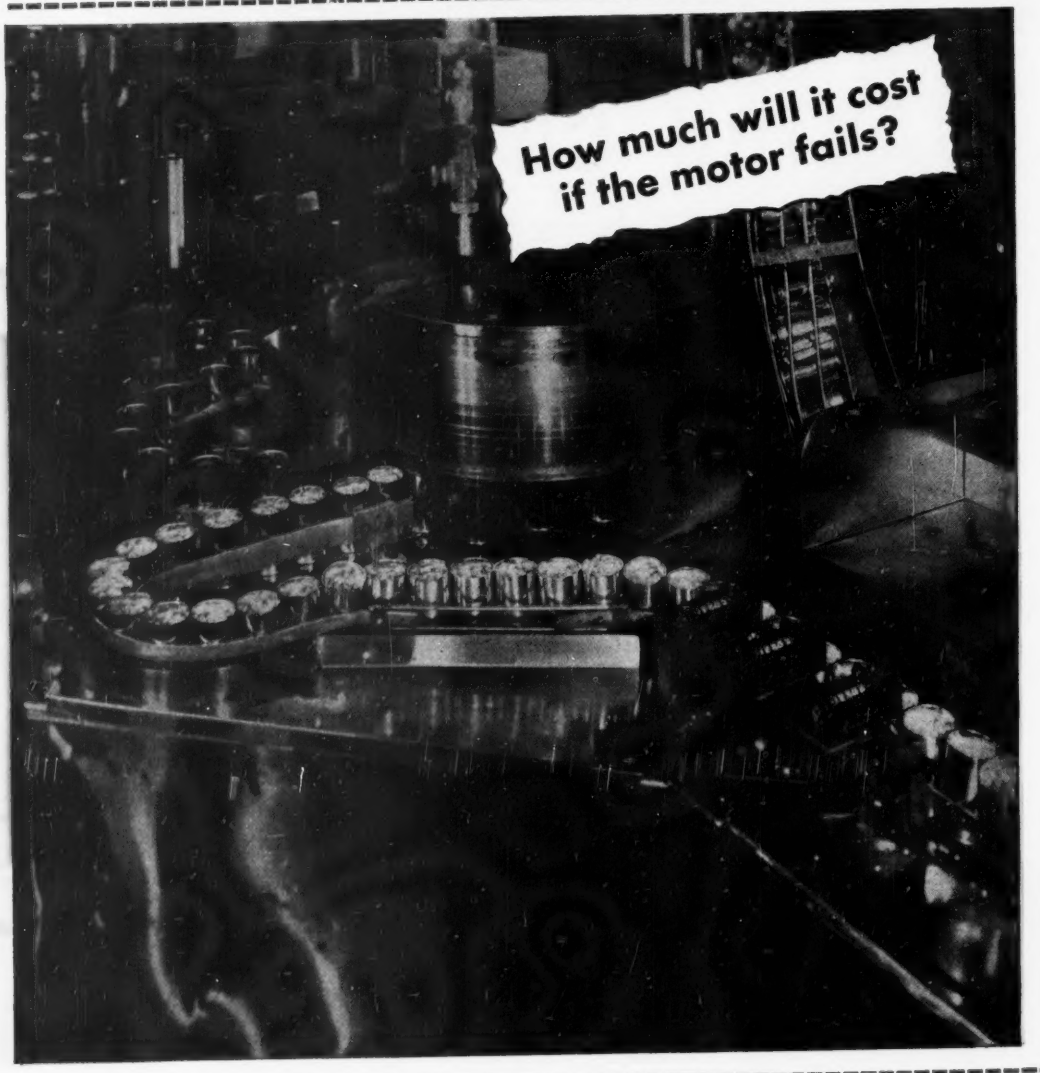

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J-21562

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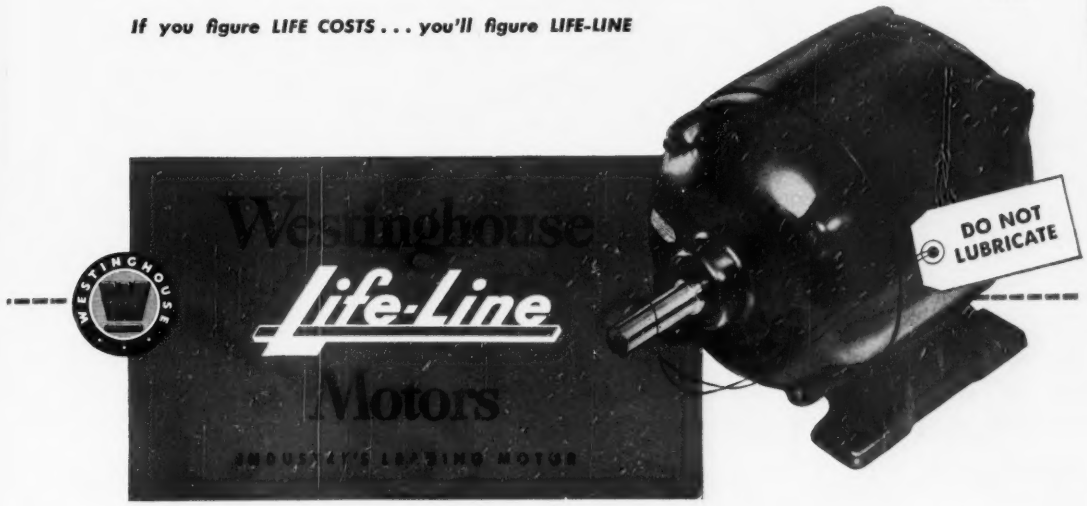

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MAY, 1950

Food Industries

Big Crop of Engineers Presents an Opportunity

There is expected to be a surplus crop of engineers this spring. The biggest college graduating class in history will number some 500,000, or more than twice as many as were graduated in prewar 1940.

About 50,000 will have engineering degrees. And it is a real boom to industry and to society to be favored with such a large increase in engineering talent. But the U. S. Department of Labor estimates that there will be jobs for only about half of them.

So there will be a surplus of technically trained men. And food processors ought to be alert to the opportunities which this situation affords them.

Probably not more than a half of one percent of the total engineering graduates will be specifically trained to step into jobs in the food processing field. Only a limited number of schools train food engineers and technologists, and some of these graduate only five or ten such men a year.

But the number of technically trained men who could be used to advantage in the food processing industry greatly exceeds the number of food specialists produced.

There is not a shadow of a doubt that there are at least 15,000 food plants which can use technical men. And most of these have not taken full advantage of the opportunities for progress which such employees offer.

The coming surplus crop of college graduates presents food processors an excellent opportunity to start correcting this deficiency. It gives them the best chance they ever have had to acquire men who can help them lick their production problems, fight their cost battles and prepare for whatever the future may bring.

Processors should not be afraid of the cost. College graduates with B. S. degrees in engineering can be hired for $250 to $300 a month. And this is not expensive when you consider that you pay skilled workers that much.

And think of the benefits of having plenty of engineering help in a food plant. The engineering type of mind is highly useful in a general sense. It is trained to deal with basic facts and to analyze problems in terms of fundamentals. It can put 2 and 2 together and come out with 4, not 5 or 6 as may the mind influenced by emotion or prejudice, or that which can't see the forest for the trees.

This makes the average young engineer good raw material. You can fit him into any number of channels in an organization. However, the greatest immediate value of an engineer lies in the capacity for which he was trained.

Every food processor is up to his neck in engineering, whether he realizes it or not. Well-engineered operations are the basis of efficient day-to-day production and lower costs, as well as the foundation for future progress.

There are a host of little engineering opportunities in every food plant. We refer to the development of practical ideas which improve operations, reduce costs, and eliminate accident hazards. We know of one food plant where a smart engineer has made more than 30 worthwhile minor improvements, the total benefit from which is considerable. In another plant we recently came across a dozen such improvements, one so good that it has become a "hot" new piece of food plant equipment.

Major engineering opportunities also are widely prevalent, especially when processors often find it necessary to develop their own machines to meet modern requirements.

For the good of their profit picture and competitive position, top executives should bring more technical men into their food processing plants. Those specially trained for careers in the food industry should be given first preference. But you can use others, especially chemical, mechanical, and industrial engineers. All of these are qualified to handle food plant engineering problems.

Now is the time. By contacting universities and colleges, you can get your pick of high-caliber young men.

—F. K. LAWLER, *Editor*

1 **GROUP TESTING** is practiced in cases when several persons are under examination.

2 **INDIVIDUAL TESTING** permits administration of personal tests to supplement group tests.

3 **PERSONAL INTERVIEW** is used to check results of tests, and to integrate information on individual.

Can Psychometric Technics Predict Job Performance?

"YES—and with high accuracy," declare authors, who have just demonstrated the method in tests of more than 375 key canning industry personnel

ROY A. DOTY and S. P. SPEARS,
George Fry & Associates, Inc., Chicago, Ill.

An individual's performance on a supervisory job can be predicted with unusual accuracy by means of psychological tests and a brief interview with a psychologist.

This was determined in a recent study of more than 375 key personnel in the canning industry. In addition, these psychometric technics identified those characteristics which differentiate the good supervisor from the poor one, and the average supervisor from average people in general. The odds, for example, are 19 to 1 that the supervisor whose performance is above average is also above average in general intelligence. And the chances are 6 to 1 that the supervisor who is below average in intelligence is rated "poor" by his superiors.

The examinations were conducted in connection with the establishment of selection programs and the evaluation of key personnel in several canning companies.

■ *While the data presented here are confined to the canning industry, the evidence indicates that the same approach is readily applicable to any of the food-processing industries.*

Size of the companies included in the survey varied from the single-plant company to large national organizations. Products ranged from canned and frozen vegetables, which have short and intense packs, to the less seasonal food items. It may be pointed out that the former products were in the majority.

Jobs covered represent the entire range, from top executives to factory mechanics and fieldmen. Detailed results presented are limited, however, to the 203 supervisors of plant manager level and below.

Ratings Checked Back

To determine how well performance on the job can be predicted, results of the psychological examinations for 105 people were compared with independent ratings of the same people by their superiors. To guard against possible unreliability of supervisory ratings, particular care was taken to include only employees who were well known to the people rating them.

On the basis of a 5-point scale (superior, above-average, average, below-average, and low) the relationships between the ratings on the basis of the psychologist's examinations and the ratings by superiors were as follows: Exact agreement, 68.6 percent, difference of one category, 27.6 percent, difference of two categories, 3.8 percent, difference of three categories, 0, and difference of four categories, 0. Prediction of success, then, was accurate within ± 1 point on the scale in 96 percent of the cases.

Further analysis of the compared ratings brought the following interesting results:

(A) 93 percent of the unsuccessful (rated "below-average" or "low" by superiors) were correctly identified.

(B) 88 percent of the successful (rated "average," "above-average," or "superior") were correctly identified.

(C) 90 percent of those rated "above-average" or "superior" were identified by the examinations as having outstanding qualifications.

(D) Had the psychological ratings been used as the basis of selection with an aptitude rating of "average" required, 99 percent of those employed would have worked out on the job satisfactorily.

(E) If the psychological ratings had been used as the basis for selection with an "above-average" rating required for employment, 100 percent of those selected would have worked out on the job satisfactorily.

What Traits for Success?

The psychological tests measured intellectual ability, knowledge of accepted supervisory principles and practices, interest in various types of activity, and a series of personality traits. As stated, complete test results were available on 203 supervisory personnel in plant and field jobs. These are shown graphically in Figs. 1 and 2. Significant differences were found between the total group studied and the average of people in general; also between those employees of outstanding performance and those rated "below-average" or "low" in performance.

Intellectual Ability. The ability to learn rapidly, to handle problems of a high degree of complexity and abstractness, and to think analytically, are the outstanding differences between good and poor supervisors in the group studied. Although the average intellectual ability of the supervisors is only slightly above the average for all people, there is a wide difference in intelligence between the poor (rated "below-average" and "low" by superiors) and the good (rated "above-average" and "superior") supervisory personnel.

The typical (median) supervisor of this group exceeds 57 percent of employed people in a test of general intelligence. However, the good supervisor exceeded 86 percent of people in this respect, while the supervisor with a poor performance rating exceeds only 25 percent of employed people.

If an intelligence-test score in the range of the upper one-half of employed people had been required in selecting this group, 85 percent of the poor performers would not have been placed in jobs above their capabilities. On the other hand, 95 percent of the good performers would have passed this hurdle.

A word of caution is in order: It cannot be reasoned from the above that the chances are 95 in 100 that a person who has above average intelligence will be a good supervisor. The fallacy is obvious. Such a person may lack other qualifications necessary for the job.

If a man has the other necessary qualifications which the present "good" group has, the chances of success are 19 to 1—if he *also* has above-average intellectual ability.

Supervisory Knowledge and Attitudes. The 203 supervisors made a median score higher than that made by 38 percent of the supervisors in general. Again, the difference between the scores of the good and the poor group is large. The median score of the former group exceeds 77 percent of supervisors in general while that of the latter group exceeds the scores of only 12 percent. The results not only indicate that better selection is possible, but also that supervisory training is sorely needed by many employees.

The supervisory knowledge and attitudes of the most successful supervisors is characterized by an understanding of human motivation, a respect for the individual worker, and an awareness of the effect of worker attitudes on production.

What Results Show

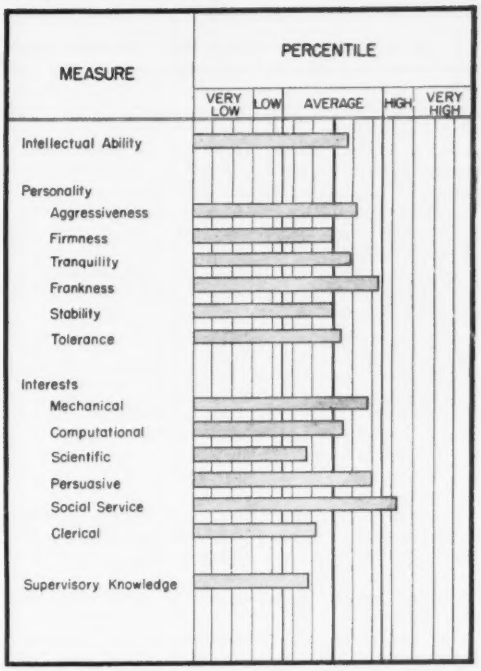


FIG. 1. SCORING of 203 supervisors reveals that they exceed 57 percent of employed people in general intelligence.

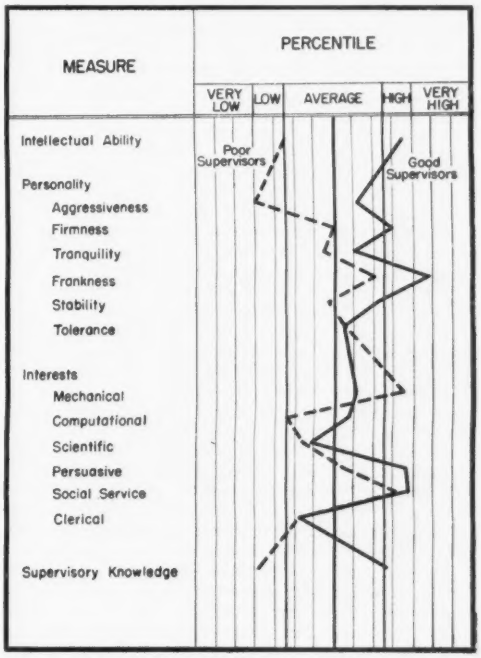


FIG. 2. GOOD SUPERVISORS are characterized by high intellect, superior knowledge of supervisory procedures.

Gaging the Good Supervisor

"Companies wishing to build a strong managerial force must require both the basic background of training and experience and the personality characteristics which will bring this training and experience to bear on the immediate problems of the job. To insure the greatest likelihood of success, the prospective supervisor should be high in intellectual capacity, aggressive and positive, emotionally stable, and even in temperament. He should have a superior knowledge of acceptable supervisory procedures. He should be interested in mechanical work but not to the exclusion of leadership activities. He should have a sincere interest in people and sufficient interest in office procedures to permit him to carry out these aspects of his duties without becoming restive."

The poor supervisor, on the other hand, tends to be "old school." For example, he may believe: (a) That the supervisor's value to the company depends principally upon how much he knows about the jobs he will supervise; (b) that it is impossible for a supervisor to plan his procedures, and (c) that the way to handle a tough worker is to be tougher than he is.

Personality Characteristics. An individual may have the background of training and experience for a job, plus the intellectual capacity for comprehending the problems involved in it, but he also needs the personality traits which will permit him to implement his ability in order to be successful. What are these personality traits?

The total group of supervisors differed significantly from people in general in only one of the six personality traits measured. This was in the frankness and straightforwardness with which they faced difficulties and problem situations. In this respect, the median supervisor exceeds 74 percent of a large industrial group.

The "average man" appearance of the total supervisor group, however, is misleading. The difference between the personality traits of the good and the poor supervisors is both large and significant. The effect of combining the two groups is that of averaging the heights of a group of tall men and a group of short ones.

The good supervisor shows a greater inclination than 60 percent of people in general to be extrovert in his behavior, to be aggressive in social relationships, and to lead rather than to follow. Those in the poor group, on the contrary, exceed only 10 percent of employed people in this regard. They tend to be quiet, conservative, and serious; they generally lack aggressiveness and are concerned with doing a correct job rather than a good job. In some cases, however, the evidence indicates that some of the more conservative individuals do have adequate sincerity and drive to make them very effective in some supervisory positions. A clinical-type interview is the best means of determining in advance whether the conservativeness is associated with aggressiveness or with a retiring approach to managerial problems.

The good supervisor exceeds approximately 80 percent of employed persons in the inclination to think for himself, to make independent decisions, and to stand on his judgments. The poor supervisor, on the other hand, is more easily "suggestible," looks to superiors for decisions, and is more inclined to vacillate.

The good supervisor is above average in his tolerance of the shortcomings of others and in the evenness of his disposition. He is not, however, placid in his temperament or sentimental in personnel relationships. The poor supervisor holds unusually strong attitudes, tends to be prejudiced and biased, and is more irritable than the normal person.

On the one characteristic—frankness—in which the test group differs significantly from the normal, the good supervisors exceed 86 percent of a normal group. The poor supervisor is only slightly above average in this characteristic.

Whereas the entire group appears almost exactly average in general stability, the good supervisors exceed 72 percent of the general population in this respect, and the poor group is below average. The good supervisor is free from major feelings of insecurity, does not worry excessively, bears up well under pressure, and is able to accept responsibility without becoming disturbed. The poor supervisor is slightly below average in these characteristics.

Interests. By and large, an individual does his best work if the activities involved in the job are along the lines of his basic interests. Interest does not necessarily indicate ability, but the two tend to go together. The person who is interested in an activity derives more personal satisfaction from it and tends to apply himself more enthusiastically to it.

What are the relative interests of this group of supervisors in the canning industry?

The entire group differed significantly from a normal group in: (1) Their interest in dealing with others in a capacity of leadership or persuasion; (2) their interest in social service activities, and (3) preference for mechanical work. A comparison of the good and poor groups indicated that the good supervisor is less concerned with mechanical work than the poor one and is much more concerned with leadership activities. The good group also differs significantly from the poor group in showing more interest in work involving computation; costs and profits, perhaps. In other respects, their interest patterns are essentially the same.

How Can a Company Use These Tests?

Psychological testing is essentially a means of obtaining information about an individual which, when integrated with all other available information, will provide a more sound basis for making decisions concerning him. To the extent that they provide valid information of this type, these tests are useful at all job levels and in all sizes and types of businesses. Their applicability to seasonal jobs is also evident.

The value of psychological tests in any business will depend upon: (1) Selection of tests which will measure the traits necessary in a job; (2) care used in determining what tests and what ranges of test scores indicate greatest likelihood of job success, and (3) ability of the person who interprets the test results.

The fact that a test is valid for one job does not necessarily mean that it is valid for another. A test score standard which predicts success in one company may not do so in another organization. For example, results obtained in the present study can be used as points of reference, but are not necessarily specifically applicable to an individual company.

In setting up such a program, it is usually best for the company to obtain the assistance of an outside person who is thoroughly trained in psychological testing and who has had extensive experience in applying the tests to industrial situations. This person can assist the company in grouping jobs which require similar personality traits, in selecting the correct tests, and in establishing the ranges of scores which indicate greatest likelihood of job success. He can also train the individual who is to administer the program and set up procedures for keeping the program up-to-date.

If the indicated steps are followed adequately, accuracy approaching that of the present study can be expected in predicting supervisory performance in any company.

ROUGH handling as well as the depredations of weather add to the difficulties of finding adequate containers.

Packaging for Combat Conditions

Development of containers and packing methods that will really protect foods under the extreme conditions outlined here has still a long way to go

Albert V. Grundy
Director, Container Laboratories, Q. M. Food and Container Institute for the Armed Forces, Chicago

Problems of the Container Division, QM Food and Container Institute for the Armed Forces, may be summarized as the need for sturdy container materials, rugged container construction, development of new packaging materials, and working out of new packaging technics.

Solutions of these problems depend upon coordinated efforts of industry and the Institute. Economic factors can not be regarded any less seriously than are the technical and engineering factors applying to protective packaging.

So extensive were the areas in which the Armed Forces operated during World War II that the problems during that period were more frequently those caused by high humidity and tropical temperature than those resulting from extreme cold. For that reason the postwar attitude of the Department of the Army is best expressed by quoting the April 15, 1948, directive from the Office of the Adjutant General.

"To assure effective performance of U. S. Armed Forces when deployed in any part of the world in any climate, the following temperature range for use in design is established:

"Equipment and supplies must be capable of satisfactory performance at any air temperature from —80 deg. F. (for periods of several days at a time) to 160 deg. F. (for periods of at least four hours daily)."

In line with this directive, our first effort has been to develop test procedures for determining physical characteristics, such as: Brittleness, gas and water-vapor transmission rate, stretch, tear and puncture resistance, and the flexibility of packaging materials at temperatures as low as —80 deg. F.

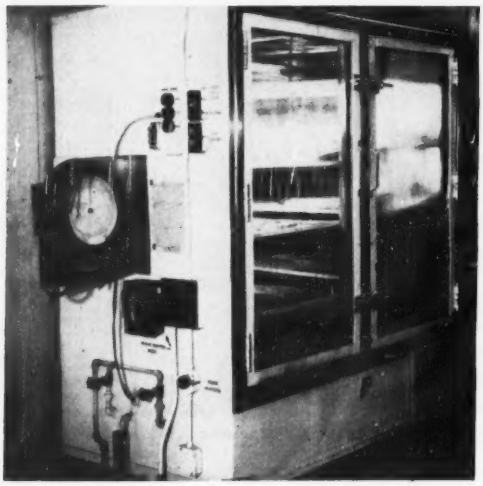
Although there are standard ASTM and TAPPI methods for determining these properties at room temperatures and above, none as yet has been established for the subzero temperatures. Since many packaging materials have failed to stand up in field tests at temperatures in the extreme subzero range, it is necessary to learn wherein they have failed and thus provide the data needed for improvement. Once the low temperature properties of packaging materials have been determined, a basis for the development of adequate materials for use in packaging supplies will have been provided. The solution of this problem involves the development of special test equipment that can be operated at temperature as low as —80 deg. F.

This is the third in a series of articles on key problems in the development of adequate foods and containers for the armed forces. Prepared under Quartermaster direction, the series outlines the general and specific areas of research in which cooperation of the food industry is essential if satisfactory solutions are to be found.

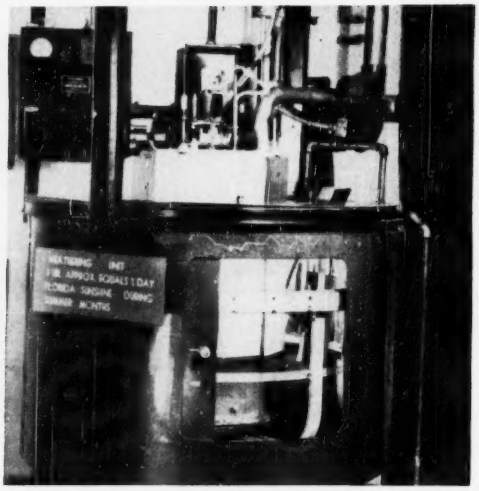
Of parallel interest is the problem of providing a method to determine the resistance of a given container material with regard to rough handling, atmospheric cyclic-exposure and quick-leak hazards, which may be applied to military specifications as a practical test to screen out materials that do not qualify. The present military specification contains tests that by common agreement are inadequate for practical purposes. The problem in this case is to modify the test without sacrificing its reliability in predicting performance under extreme conditions.

A problem, which is essentially one of the resistance of barrier materials, is the limited ability of existing waterproof shipping case liners to withstand low temperatures. In seeking a ma-

Pushbutton Humid-and-Hot Weather Helps In Tests



ATMOSPHERIC conditions ranging from room to 100 deg. F. and 90 Percent R. H. are reproducible in this cabinet.



ONE-HOUR test in this weatherometer is equal to 25 hours exposure to the sunshine and rain of the tropics.

terial that will perform satisfactorily, development workers are placed right on the horns of a technical dilemma. Thus, most waterproof liners fabricated with laminates, which remain flexible at —20 deg. F. or below, fail to perform satisfactorily at temperatures of 140 deg. F. or above. At these higher temperatures they are subjected to bleeding, blocking and separation of the laminated plies. Materials capable of withstanding these high temperatures do not remain flexible at the lower temperatures. Under rough handling at low temperatures, they retain little of their protective quality. The problem is to find a waterproof shipping case liner capable of meeting both extremes of temperature.

Waterproof case liners have many uses—and in each use a particular problem is posed. In packaging some products, a waterproof case liner that will permit "breathing" is required. Otherwise, mold and degradation of the packaged contents will result. The problem in this case is how to maintain waterproofness in the case liner and at the same time permit the "breathing" action necessary to maintain the good condition of the contents.

In packaging other products, the problem is to provide for slow evaporation from within the shipping cases and at the same time prevent reabsorption of water from sources outside the cases during transit and storage. The retention of water-vapor within the cases induces mold and rancidity, with resultant damage to the product—a damage that is accelerated at high temperatures. Packaging of spices and other flavoring materials presents an opposite problem. Every avenue of escape through which their strength is reduced by dissipation of their volatile constituents must be hermetically sealed. Metal cans generally are used, but the inevitable shortage of such cans in wartime would make it mandatory to find a suitable alternate for overseas shipment.

The preceding problems have been presented to place before the reader some typical problems that emerge from our assignment of packaging and packing of some 80,000 Quartermaster Corps items. Packaging for protection against insect infestation is an equally important problem.

In packaging of flour, other cereal products, and dehydrated foods, protection against infestation is of first consideration. The development of a suitable insect-repellent container for this purpose is made necessary by the adverse conditions of military transportation and storage. The impregnation of bag materials with insect-repellent chemicals is the logical answer, but the effect of the chemicals on the foods cannot be overlooked. The major hazard, of course, is the transmission of toxic substances. Further, it is necessary to develop several types of insect-repellent treatments in order that the sources of supply may be broadened. The effectiveness of one such repellent is to be investigated by means of a preliminary field test using nine carloads (14,400 bags) of insect-free flour. One-half of the flour will be packaged in multiwall paper sacks, the outside ply of which will be treated with a commercially available mixture of piperonyl butoxide and pyrethrins. Opportunity to test other promising repellent materials is desired.

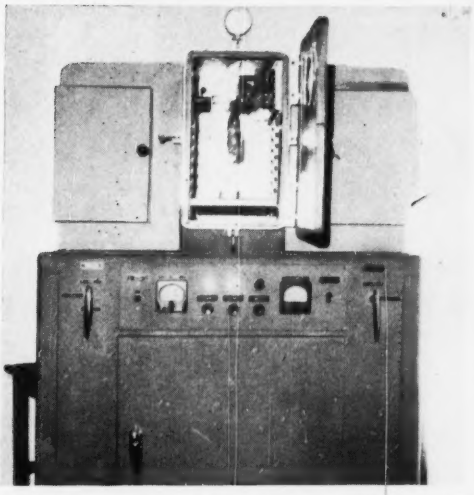
Adhesives, Glass, Metal Problems

Since we have been presenting problems more specific to flexible rather than to rigid container materials, an appropriate subject for discussion is adhesives. The need of the Armed Forces in this field is for an adhesive for use in sealing containers, container materials and case liners that will perform satisfactorily under rough handling in temperatures ranging from —80 to 160 deg. F. The difficulty here is once again the performance of existing adhesives at low temperatures. Asphalt sealing compounds, for example, become brittle at —10 to —20 deg. F., the component plies of barrier materials separate, and a faulty closure results.

A problem of considerable concern in the rigid container field at the present time is that of packing glass containers to prevent breakage during shipment. Our immediate concern is to obtain a means less expensive than the presently specified nailed wood box with sawdust or excelsior as cushioning medium. The method must be adapted to commercial high-speed packing technics and be economical of shipping space and weight. Here again, the problem is one somewhat specific to the adversities of military handling.

Metal containers for subsistence items offer a variety of problems—those brought about by the acidic nature of the contents, the difficulty of opening and the inefficiency of a par-

Packaged for Storage and Handling under Arctic Conditions



STORAGE and rough handling tests are made after packages are sealed under vacuum, air or inert gas by this unit.

EFFECTS of extreme cold upon medium-weight containers are watched in –40 deg. F. room, using portable drop tester.

ticular kind of closure being typical. Mustard, salad dressing and pickles packaged in metal containers are not well-suited to long storage. The major can manufacturers, for example, do not recommend the use of metal cans for mustard if the storage period is expected to exceed six months at temperatures fluctuating between 40 and 90 deg. F. Can linings have been used with salad dressing, but, under military conditions of storage, their performance has not been satisfactory. Pinholing at the side seams of metal cans containing sweet pickles has been reported to be a cause of spoilage in storage.

Difficulties With Closures

Other problems of current concern are the development of an easier means of opening the small ration can (1½ oz.) used for jam. Two types of containers are now in use—one with a tear tab and the other with a circular score on the cover for convenience in opening with a can opener or knife. Since the tabs often break on the one type of can and the knife or can opener leaves a jagged edge on the other, the need is for a can that may be more safely, easily and surely opened. The problem would appear to be simple. To some it might even appear to be non-existent. But in high-speed combat operations, the want of a quick, sure means of opening a can could cause a delay both demoralizing and costly.

Another closure problem of present concern applies to the use of multiple friction plug cans used for overseas shipment. Spot-soldering at three equidistant points on the rim is the method now used to attach the plug to the friction ring for domestic shipment. In handling and shipping, the solder breaks and the plugs become disengaged. Waste of contents, plus serious damage to adjacent cargo is the result; a situation that is intolerable during high-tempo mobility of supply operations necessitated by modern warfare.

How Packages Are Tested

Package development necessitates adequate testing equipment. It has been made abundantly clear to those of us long experienced in military supply-line problems that to recommend the proper solution to a packaging or packing problem, it is necessary to know what container materials best serve the purpose. To this end, we have testing equipment to measure the tensile strength of materials, their tear, puncture, bursting, scuff resistance, stretch and waterproofness. Also available is equipment to test seal efficiency, water-vapor transmission, and adhesion strength of sealing materials.

Although we have made innovations of our own, the major testing equipment used is of standard design. This equipment is designed to comply with TAPPI and ASTM recommendations.

Our conditioning rooms for testing performance of containers and container materials under selected temperatures and relative humidities are, on the contrary, not usually available in the commercial laboratory. Our test range for temperature resistance runs from —40 to 160 deg. F., and relative humidities can be obtained from 25 up 90 percent.

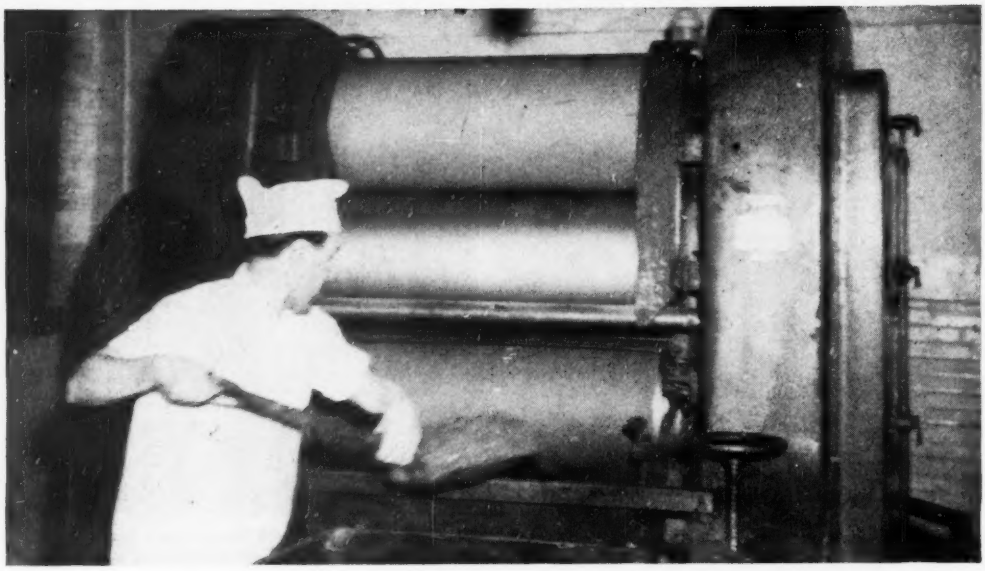
Since conditions of temperature and humidity often change rapidly, our cycling room has proved highly useful in determining the potential performance of packaged supplies under these variable conditions. The present cycle of this room is such that the temperatures and humidity can be varied from 120 deg. F. and 25 percent RH to 70 deg. F. and 90 percent RH. We also have a room which simulates tropical conditions of temperature and humidity. This room is operating at a constant temperature of 100 deg. and 90 percent RH.

The "artificial ageing" of packaging materials by exposure to synthetic sunlight and rain is accomplished by means of a "weatherometer" or accelerated weathering unit. One hour of test in the weatherometer is roughly equivalent to 25 hours of exposure to the severest conditions of "sun" and "rain" that prevail in tropical areas.

Our laboratories are also equipped to determine the resistance of completed packs to rough handling. For this purpose the 7-ft. revolving drum, commonly used in industry, is utilized. Also available is a 3½-ft. revolving drum for testing light packages. In addition, we have an incline-impact tester, drop tester, and compression testing machine.

To simulate rainfall and immersion in water, a shower cabinet and immersion tanks are provided. Many of our completed packs and components of packs are submitted to tests duplicating as nearly as possible the

(*Turn to page* 216)



CORRECTLY set and properly operating rolls have a uniform film of chocolate paste covering them from end to end. Improperly set rolls will have bare spots or streaks or they will be spitting or dropping the paste.

How to Make a Fine Chocolate

Use 5-roll refiner correctly installed, adjusted and operated on properly mixed chocolate paste under uniform operating conditions

C. M. COULTER
Development Engineer, Chicago

Fineness is the chief quality sought, regardless of type of chocolate made or used by chocolate and candy manufacturers. Correct fineness gives chocolate a "fullness of taste" and a soft creamy smoothness, as contrasted with greasy slickness of the over-refined and the grittiness or roughness of the under-refined chocolate.

Attainment of that soft creamy smoothness has always been the objective of the chocolate maker, to the extent that the old-timers of 30 to 40 years ago did not spare labor or expense in their efforts. They passed and repassed their chocolate paste, consisting of chocolate liquor, powdered sugar, cocoa butter, and often milk plus other flavorings, through the old three-roll horizontal refiners. The paste was molded into cakes prior to passage through the refiners with the hope that the desired texture could be obtained by feeding small quantities at a time into the machine. Chemical aids were even used.

But the finished product was never fine enough; never had the desired texture. Some subjected their product to long periods of conging. This did give the chocolate an improved flavor and the creamy texture, but the desired fineness was still missing. Not until Mr. Holstein of Lehman Co. invented the famous No. 912 5-roll refiner was that fineness attained.

Hailed as "Best Ever"

This high-speed, 280-300-rpm. upright or vertical refiner did not fly out of the factory windows, as some of the skepties predicted it would. It did turn out the most evenly refined chocolate that anyone in the industry had ever seen. Its rolls run with a uniform film of chocolate covering them. The ends of the rolls do not get hot, as they did on the old refiners. The rate of production can be controlled from as low as 400 lb. per hr. with thin paste to as high as 1,200 lb. per hr. with stiff heavy paste. The rate of 800 lb. per hr. was astonishing when the refiner was introduced; particularly when the chocolate was the finest that anyone could desire and came to be regarded as a standard product.

During the late war, the program of equipping plants to make fine chocolate was interrupted, and the quality of chocolate has degenerated until it is now almost as poor as it was before the introduction of the Lehman 5-roll refiner in the late 1920's. Poor refining is the reason. Considering all the machinery now available to make good chocolate, this state of affairs is inexcusable. There are three manufacturers of good chocolate refiners on which refining can be controlled.

The reason for all of the coarse, gritty chocolate now on the market may be that the chocolate manufacturers are not using their refiners to the best advantage. In a factory I recently visited, I saw one of these fine machines rusting in a corner, while the chocolate was being passed through a disk mill without getting much refining. It may also be that these chocolate manufacturers still do not know how to use their 5-roll refiners. I have been in plants where the refiners were running with blotches and streaks of chocolate on the rolls instead of with the uniform film which should have been on them.

Success with the 5-roll refiner depends upon the manner in which it is installed, adjusted, cared for and operated. The following suggestions are based on years of experience in chocolate manufacture and are stated in terms of the practical operator, with avoidance of technical terminology and mathematical expression of fineness.

For best performance, a 5-roll refiner should be installed on a firm, nonvibrating base and in a room free from drafts of hot or cold air. If the temperature of the room is greater than 80 deg. F., the rolls will need additional internal water-cooling to offset the effects of the increased room temperature. The objective of the use of cooling water is to prevent each roll from expanding and becoming out of adjustment or "setting" in relation to their ends or middle, as well as in relation to the other rolls in the refiner. The machine should be precisionally leveled, using the second from the bottom or "fixed" roll as a guide for the leveling. If that precaution be observed and the other rolls adjusted or "set" in relation to this fixed roll, all the other rolls will be level, and the refiner will be ready to operate satisfactorily.

Temperature Is Criterion

The normal supply of cooling water for the rolls should be ample to counteract the heat of friction resulting from turning the rolls and grinding the chocolate. For a 50-hp. motor, about 20 gal. per min. of water at 55 deg. F. will be needed in a room of 80 deg. F. To that quantity should be added a generous amount, about 5 gal. per min., for room temperature over 80 deg. F. and waste which cannot be economically avoided. The water used for this purpose should not be colder than 55 deg. F., nor warmer than 75 deg. F. When the water is too warm or too cold, setting of the valves to keep the rolls at a uniform temperature is difficult. The importance of keeping the rolls at a uniform temperature can be understood when it is realized that if they get too cold they will shrink in diameter and let the chocolate pass through without refining. If they get too warm, the rolls will expand and crowd the chocolate off their ends into the drip-pan. And, what is worse, if they run tight (metal to metal) for even a short while, the sugar content of the chocolate will crystallize and finally char on the ends of the rolls. The smooth surfaces of the rolls will be ruined for fine work. Only refinishing of the rolls at the manufacturer's plant will return them to their original smoothness.

The importance of preparing the chocolate paste *for the refiner* cannot be over-stressed. If it is poorly mixed, leaving isolated lumps of milk-powder and pulverized sugar mixed with a paste that is too hard in some spots and too soft in others, the refiner cannot be expected to do a good job. It can take in the mixture only as it comes, throwing the dry stuff off the rolls into the air, letting the soft paste slide off the roll ends down into the drip-pan, and giving a poor grind to what does pass through. If the paste is uniformly mixed and of the proper consistency for the desired fineness, it will go through the roll under positive control as regards fineness and rate of production. Within certain limits, the mixing of the chocolate paste determines and controls the fineness of the finished product. The softer the paste fed into it, the finer the refiner will grind it.

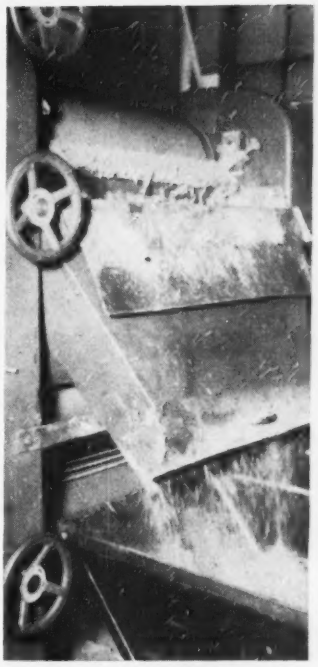
Pointers On the Paste

For example, if a well-mixed paste is prepared, containing about 25 percent total fat, it will pass through the refiner at about 500 lb. per hr. and will be ground very fine. If a softer paste is put through the roll, loosening of the rolls will be necessary to avoid spilling off the ends, and it will not be ground as fine as is the first. In the so-called wet-grinding, chocolate with as much as 35 percent total fat is put through the refiner in the liquid state. The rolls have to be set for that condition. They have to be set so loose that the chocolate is not made fine by the treatment, but it does attain a creamy texture which is desirable.

At the other extreme of grinding, where large production is wanted from the roll, the paste must be made stiffer so the machine will take it in faster. By this means, as much as 2,000 lb. per hr. can be reasonably well ground in a No. 912 Lehmann 5-roll refiner. After use for this kind of grinding, the rolls have to be resurfaced before they can again be used for fine grinding. It should be observed here that there is one best setting of the rolls for each condition of the chocolate paste fed into them.

5 Steps In Roll Setting

This brings us to the problem of setting the rolls. This operation seems to be a puzzle for operators in some of the small factories. I shall give a few simple rules for doing the job so as to get good results. First, the machine must be clean. Not even a wizard or a magician can persuade a dirty machine to produce a fine chocolate. The roll-adjusting hand-wheels must turn easily. A jammed adjusting mechanism can thwart the best efforts of even an expert. No one can tell just when he has contacted one roll against another under those conditions. Assuming that those conditions have been met, let us proceed to set the rolls.



"DOCTOR BLADE" or knife removes the refined paste cleanly from the top roll. If set too tightly, it will cause the roll to heat and will wear out too rapidly.

First, a preliminary setting is made with the machine stopped:

1. Loosen all the hand-wheels to give room in which to work.

2. Note that the second roll from the bottom, the one behind the feed hopper, is the fixed roll, and begin the adjustment by setting the third roll firmly against this fixed roll. Turn the hand-wheels as much as can be done with the bare hands. Then back them off (loosen them) about a half turn of the hand-wheel.

3. In a similar manner, set the fourth roll against the third, and the fifth, or top roll, against the fourth.

4. Set the feed roll, bottom or first roll, firmly against the fixed roll and then loosen the hand-wheels about a half turn. This will be too much for a stiff paste, but it can be adjusted when the refiner is started.

5. Put about 100 lb. of paste in the feed hopper, start the motor, and turn on the cooling water.

If the judgment of what-is-tight has been good, the feed-roll only will have to be adjusted to reduce or increase the quantity passing through the machine to get the desired fineness. But

let us assume the adjustment has not been done so well and that all the adjustments have to be corrected; too much paste is trying to go through the rolls, the chocolate is coming out of the machine coarse, and a good part of it is falling into the drip-pan below the machine. Let the machine run and make corrections as follows:

1. Tighten the feed roll to reduce the amount of chocolate passing through the rolls.
2. Look behind the machine to see where the chocolate is falling from. Usually it will be found that the paste is running off the ends of the fixed roll, which means that the third roll is pressing too tightly against it. It will also be seen that a "rope of chocolate" is revolving in the space where these two rolls run in together, giving the appearance that the machine is "sticking out its tongue at you." Using that "rope" as an indicator to help correct the setting, carefully loosen both ends

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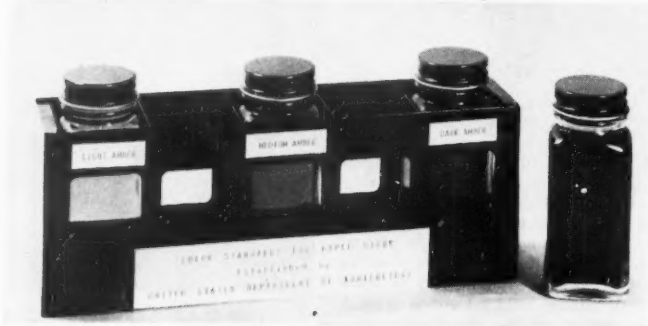
Just Place Sample Bottle in Compartment 2 or 4



COLOR COMPARATOR for maple syrup, showing blank solutions in place behind mounted amber glass standards and a sample of maple syrup to be graded.

Permanent Glass Color Standards Improve Maple Syrup Grading

Ground and polished amber-colored glass standards replace unstable caramel-glycerin solutions

B. A. BRICE and A. TURNER, JR.
Eastern Regional Research Laboratory, Bureau of Agricultural & Industrial Chemistry, Agricultural Research Administration, USDA, Philadelphia, and
F. L. SOUTHERLAND and E. P. BOSTWICK
Fruit & Vegetable Branch, Production & Marketing Administration, USDA, Washington 25, D. C.

To improve the grading of maple syrup, USDA recently developed a simple color comparator fitted with permanent standards of colored glass. The new standards are used instead of caramel-glycerin solutions. These solutions were not entirely satisfactory because they were not stable with respect to color—an important factor in grading maple syrup.

The new color comparator is an all-metal box, 8½ x 2 x 3 inches, divided by thin partitions into five compartments, each having front and rear 1¼-in. square windows. The glass color standards, Light Amber, Medium Amber, and Dark Amber, are permanently cemented against the front windows in compartments 1, 3 and 5, respectively. Three bottles filled with clear glycerin-water solutions (referred to as "blanks") are placed in back of the glass standards.

Comparison Easy To Make

To make a color comparison is simple. Pour the maple syrup into a clean dry sample bottle. Depending upon rough estimate of hue, place it in compartment 2 or 4. Hold the comparator at a convenient distance from the eye and view it in diffuse daylight. Determine the color classification of the syrup by comparison of sample with the standards. Switching the sample from compartment 2 to 4, or vice-versa, may be necessary.

If the sample is equal to Light Amber in hue, or yellower, classify it as Light Amber; if perceptibly redder, but not redder than the Medium standard, classify sample as Medium Amber; if perceptibly redder than the Medium standard, but not redder than the Dark standard, classify as Dark Amber; if redder in hue than the Dark standard, classify sample as U. S. Grade D or substandard. It is emphasized that hue (redness, yellowness) is the attribute of color to be considered in the grading.

To assist in classifying cloudy syrups, three bottles containing suspensions of bentonite in glycerin-water are available. Referred to as Cloudy A, Cloudy B and Cloudy C, they correspond to varying degrees of cloudiness permitted in the different grade classification for table maple syrup.

When the syrup is appreciably cloudy because of suspended material, its brightness is lowered and classification is difficult, particularly if the hue is near one of the standards. In such cases, color classification is made easier if the clear blank in the standard nearest in hue to the cloudy syrup is replaced by the proper cloudy suspension.

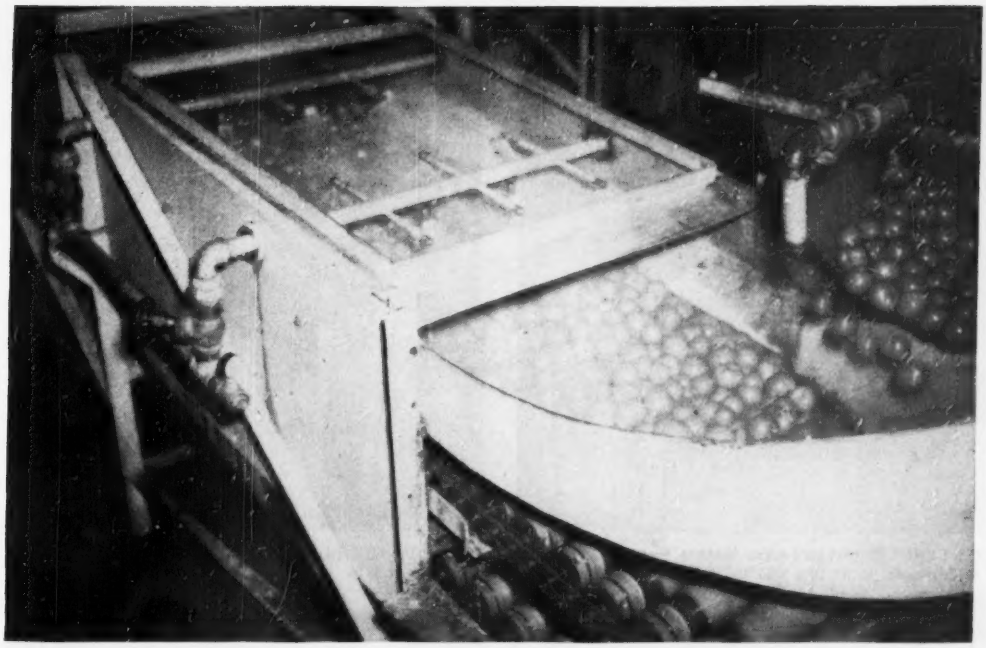
How Comparator Was Developed

It is interesting to note how the glass standards were developed. First, it was necessary to decide on a suitable inside width for the bottles. A square 2-oz. bottle having an internal dimension of 1.24 in. proved satisfactory and was adopted. Its advantages are: (1) it is available and inexpensive; (2) the relatively large thickness facilitates precise grading; and (3) the square shape provides a field of view of uniform thickness, not possible with cylindrical containers used before.

Then amber glasses were found which, when ground and polished to specifications, had colors that duplicated those of the freshly prepared caramel-glycerin solutions.

Where It Can Be Obtained

The comparator, complete with glass standards, three clear blanks, three cloudy suspensions, and empty sample bottles, is now commercially available. Purchase details and additional information may be obtained from the Food & Vegetable Branch, Production & Marketing Administration, USDA, Washington 25, D. C.; or from the Eastern Regional Research Laboratory, Philadelphia 18.



U. S. NO. 1 GRADE tomatoes produce best red color in catsup. Here, tomatoes leave rotary washer (right) and are carried by roller conveyor through pressure-spray washer (left), where remaining dirt is removed.

Get Higher Quality Via Ingredient Control

In case of catsup, reward is better color, flavor, and consistency when there is precise regulation of tomatoes, spices, sweetener, and vinegar

EDWIN M. SCHOENFELD
Manager, Product Application, Seasoning Div., Wm. J. Stange Co., Chicago

Control of factors that influence consumer acceptance of trademarked foods is highly important in a competitive market. And when the ingredient cost is also beneficially affected, such control is doubly important in the manufacture of top quality products.

An example of this kind of care is in the making of catsup, where the three prime factors—color, flavor, and consistency—are influenced by the quality of the materials and by the ratio of tomato solids in the juice to the solids of other ingredients—particularly the ratio to the sugar content. The possibilities of saving on ingredient cost lie in greater utilization of the flavor values of the spices and in the control of the sugar-to-tomato solids ratio.

Deep natural red color is commonly associated with fancy catsup, and it gives the impression that only top quality, mature tomatoes have been used. Unquestionably, U. S. No. 1 grade tomatoes, when properly handled and processed, will produce a catsup with the best color. However, each load from the field will contain varying amounts of No. 2 tomatoes and to sort them out would add to the cost of labor and tomatoes. Good practice requires handling and processing of No. 2 tomatoes with No. 1's in such a manner as to obtain results comparable to those where only the latter grade are used.

First step in making catsup is washing the tomatoes. Soft, over-ripe crushed or badly cracked tomatoes are culled out from the good ones, and where necessary slightly damaged and green portions are trimmed away. Sorted and trimmed tomatoes are then run through a cutter or "chopper box."

Next, chopped tomatoes are preheated to at least 175 deg. F., within 3 to 4 min., by using the "hot break," resulting in juice of relatively high viscosity with a normal pectin content. This also inactivates pectinase that hydrolyzes pectin to pectic acid. Inactivation helps to retain the red color, makes for good consistency.

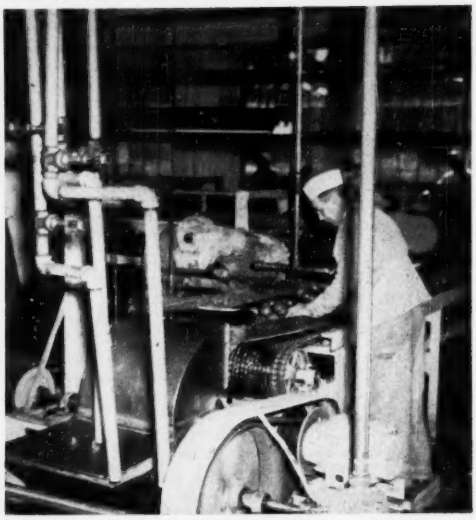
In the third step, the heated tomatoes are run through the pulper or "cyclone" to separate the liquid from coarse solids, and thus produce a "cyclone juice." Efficient operation requires transfer of this juice directly to a storage tank large enough to insure continuous operation in the cook-room during brief shut-downs along the line.

Getting a Good Hue

To obtain a good color in the finished catsup, the heated cyclone juice should be held for only a short time—for prolonged holding at 175 deg. F., or higher, will result in gradual loss of color. In addition, the pectin will adversely affect the consistency of the juice. Consequently, the juice should be concentrated as quickly as possible by: (1) Limiting the batch to the amount that can be concentrated in 30

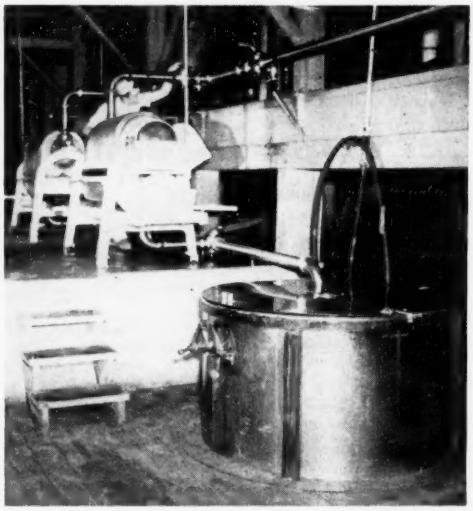
Photo-Brief—From Tomato Washing to Catsup Bottling ⟶

1 **LEAVING** pressure-spray washer (rear), tomatoes are diverted to sorting and inspection belts.



2 **FROM** final inspection, sorted and trimmed tomatoes are fed into "chopper box" (lower left).

5 **TOMATO PULP** and the other ingredients are cooked in stainless steel kettles equipped with steam coils.



6 **CATSUP** goes (rear) through finishing screens (0.027-in. mesh most common), then to tank (foreground).

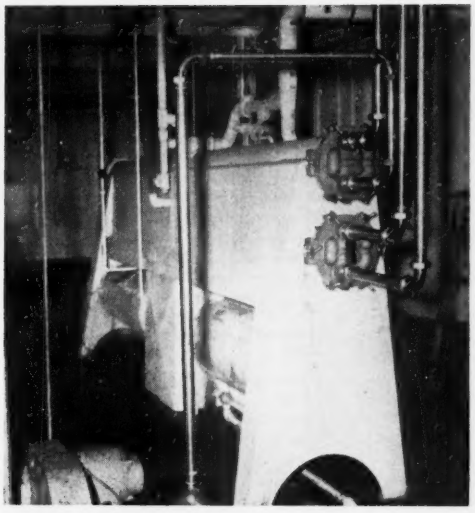
min., or less; (2) maintaining adequate steam pressure to insure concentration in 30 min.; (3) adding one-half of the sugar early in boiling to set the color; and (4) using a blend of seasoning that does not react upon the red pigment in the juice. (Later, when flavor is discussed, further comment will be made on the effect of the seasoning blend.)

Final step is quick and effective cooling. All precautions taken in previous steps will be of no avail if the cooling system is inadequate. Because of the high sugar content, caramelization may take place if the bottled catsup is not cooled to 100 deg. F., or less, within 30 min. before it is cased. This color loss is commonly referred to as "stack burn." Bottles may be effectively cooled by evaporation on a conveyor traveling through sprays of water instead of by heat exchangers.

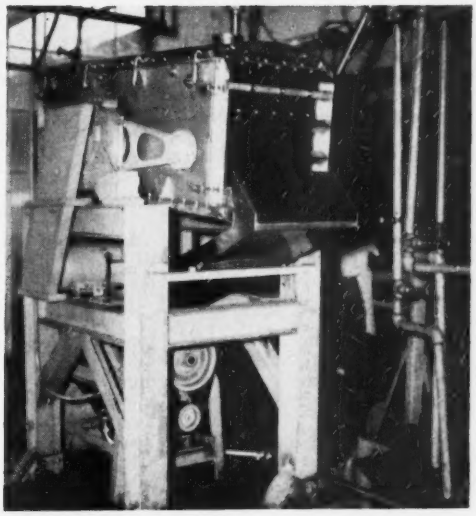
Now About Flavor

As for the second prime factor in catsup making—flavor—this is obtained by the addition of sugar, salt, vinegar and a blend of seasoning, during concentration of the juice.

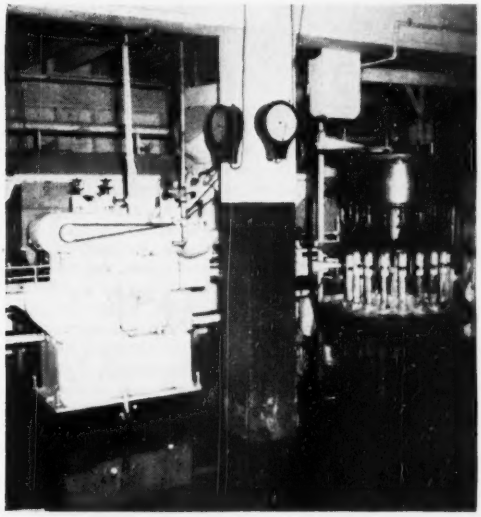
Vinegar imparts tartness, and it inhibits spoilage after the catsup is exposed to atmospheric conditions. This safeguard is particularly important because opened bottles are likely to be exposed at room temperature for prolonged periods. An acidity of 1.5 to 1.7 percent, calculated as acetic acid, will generally be adequate to give the proper protection. The tartness will



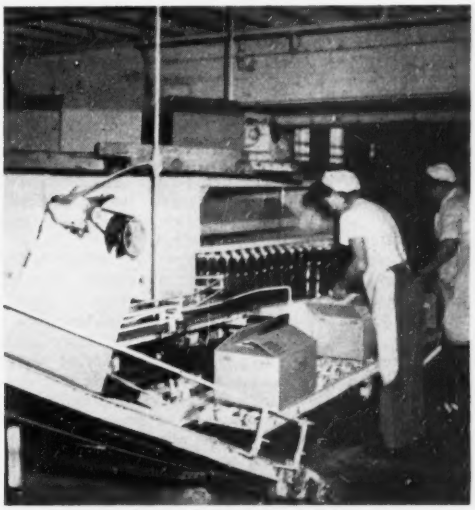
3 **COOKING** tomatoes to 160 F. in tubular heater (right) inactivates pectinase, retains color and consistency.



4 **SHAKER SCREEN** (top) removes skins, cores and stems. Pulper (below) takes out seeds, heavy fibers.



7 **ROTARY UNIT** (right) fills preheated bottles with 195 F. catsup. Then (left) bottles are capped.



8 **BY RUNNING** bottles of catsup through continuous cooler, objectionable "stack-burns" are eliminated.

be excessive and it must be counteracted by adding sugar, which will also make up for the deficiency of natural sugars in the juice. The addition of 1.5 lb. of sugar per gal. of finished catsup usually suffices.

Salt plays the same role in catsup as it does in other foods—to enhance the flavor.

No Blacknecks With Tannin-Free Spices

Seasoning is a particularly significant component of catsup. It contributes flavor and has a marked influence on color. The best practice is to use seasoning components of uniform or standardized flavoring strength—complete spice extractions containing the volatile and the non-volatile fractions. These extractives should be tannin-free, since crude or ground spices contain varying amounts of tannin that adversely affect color.

Of the spices, cloves are the worst tannin offenders. For that reason, they are the greatest contributors to the development of "blackneck." It is the tannin in the spices that, if permitted to remain, combines with minute quantities of dissolved iron in the presence of residual oxygen to form the unsightly and flavor-destroying blackneck, which had previously been so common.

Today, less blackneck catsup occurs. The credit goes to such technological improvements as: (1) Tannin-free spices or seasonings, (2) stainless steel and glass-lined equipment, (3) deaer-

ators, and (4) cappers which displace the air in the neck of the bottle.

A well-seasoned catsup, made according to the best procedures, has no outstanding spice flavor. It may suggest the presence of cloves, cinnamon or celery. But the spices or seasonings are so blended with the tomatoes that no one flavor is predominant.

Out With the Spice Bag

Prior to the adoption of technical control, catsup manufacturers customarily tied a combination of crude spices in a cloth and submerged it in the boiling juice. By this rule-of-thumb practice, tannin was introduced into the juice, the full strength of the spices was not entirely utilized, and the flavor was not uniform. In addition to variations in the flavoring strength of crude spices, the non-uniform cooking time and conditions resulted in the extraction of varying amounts of the spice flavor. Thus, the amount of spice flavors varied in different batches of catsups.

When carried out under relatively ideal conditions, the cloth-bag method of flavoring the juice resulted in only a 33 to 50 percent extraction of the spice value. Too often, more spice value was discarded than was utilized.

Attaining Proper Consistency

Now to the third factor in catsup quality—consistency. Attention has already been directed to the importance of a "hot break" in the extraction and retention of pectin in cyclone juice. Two other conditions affecting control of the viscosity of finished catsup are: (1) Percentage of tomato solids in the finished catsup, and (2) size of the mesh of the finishing screen.

Formula for Fancy Catsup

To illustrate the significance of tomato solids, let us consider the composition of a typical fancy catsup:

250 gal. of cyclone juice (6 percent solids) contains 135.15 lb. of solids;

150 lb. of sugar contains 150 lb. of solids;

30 lb. of salt contains 30 lb. of solids;

10 gal. of vinegar (100 gr.) contains no solids, and

2 lb. of catsup seasoning (tannin-free extracted spices with onion and garlic) contains 2 lb. of solids.

Total of the finished batch (100 gal.) contains 317.15 lb. of solids;

100 gal. of fancy catsup (sp. gr. 1.150) weighs 959 lb., and it has 33 percent solids, i. e.— $\frac{(317.15)}{959} \times 100 =$ **33 percent.**

While the preceding formula compiles requirements for fancy catsup—33 percent solids and 1.150 specific gravity—no consideration has been given to viscosity. There is little, if any, relationship between viscosity and specific gravity. Viscosity is as important a characteristic for fancy catsup as color or flavor.

According to standards of identity promulgated under the Food, Drug & Cosmetic Act of 1938 . . .

A catsup that flows not more than 10 cm. in 30 sec. at 20 deg. C in the Bostwich consistometer may be given a score of 22 to 25 points. A catsup that flows more than 10 cm. and not more than 18 cm. may be scored 18 to 21 points. However, the catsup that falls into the 18 to 21 point classification shall not be graded above U. S. "C" or U. S. Standard.

This definition clearly indicates that the catsup with the higher viscosity is of a higher grade.

Arriving At a Good Consistency

How to obtain the desired consistency at the lowest cost with maximum retention of fancy catsup color and flavor is the important question.

Adding more cyclone juice in the cooker and using 5 lb. less sugar for each additional 10 gal. of juice will raise the viscosity of the catsup without changing its specific gravity. But this practice adds to ingredient cost.

Conversely, adding less tomato solids and more sugar will decrease the viscosity without affecting the specific gravity. However, the shift from tomato to sugar solids will upset the flavor balance because of the increased sweetness. However, this sweetness may be compensated by substituting dextrose for part of the sucrose, since the former has only 70 percent of the sweetening power of sucrose. Replacing up to 30 percent of the sucrose with dextrose will also increase the viscosity and show a savings in ingredient cost without impairing quality.

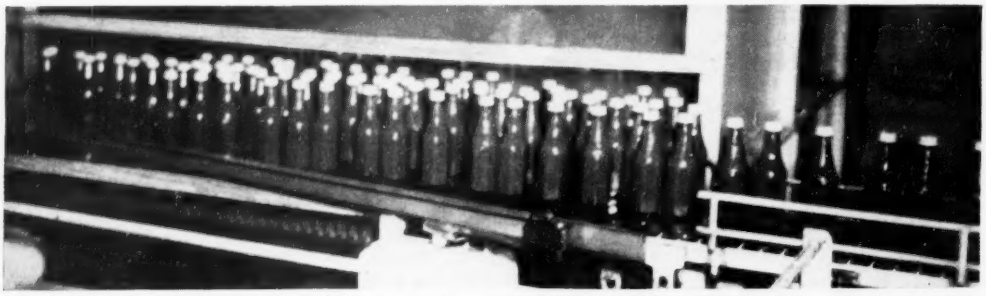
Using the Right Screens

The fibrous or insoluble portion of the cyclone juice also affects the viscosity. Thus, the longer the fibers and the more of them, the greater will be the viscosity. This explains why a finishing screen with larger perforations results in a catsup of greater viscosity. While the larger perforations give satisfactory viscosities, they promote an adverse effect—production of a catsup with a coarse body, like tomato pulp.

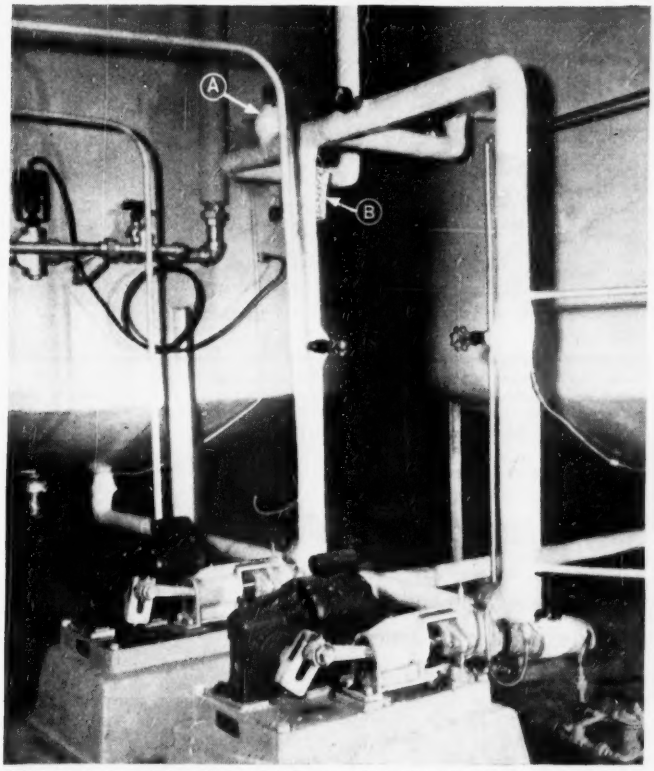
Many catsup manufacturers prefer a 0.027-in. screen. However, a 0.023-in. screen will result in a finer grained catsup. If a catsup with a very smooth body is desired, a 0.020-in. screen is recommended.

Climatic conditions during the tomato-growing season may control the size of the perforations. If the tomatoes contain an excessive amount of scar tissue, a screen with small perforations must be used to avoid the presence of black specks in the catsup. If black specks are not removed with a 0.023-in. screen, a 0.020-in. screen is recommended until the quality of the tomatoes improves.

With the development and application of technological controls over factors affecting color, flavor and consistency, manufacturers are now enjoying the rewards of greater consumer acceptance of their catsups.



"TO THE catsup manufacturer, controls mean six things: (1) Better utilization of spices or seasonings, (2) lower ingredient costs, (3) higher product quality, (4) prevention of spoilage losses, (5) reduction in production costs, and (6) greater uniformity in the color, flavor and consistency of the finished product."



STORED in two 50,000 lb. insulated, steam-heated tanks (background), liquid wax is supplied to paper-bottle machines by adjustable-stroke proportioning pumps (foreground). Pump lines are equipped with relief valves that discharge any excess wax back into supply tanks. As a further precaution, a "master" relief valve (A) empties into bucket (B) if valves are inadvertently closed against the pumps. All lines are steam-traced and lagged with magnesia.

$490 Saved Weekly Using Liquid Wax

Dairy switches from cake to liquid wax for use in paper-bottle machine. Saves 22 percent on wax, 60 percent on plant labor

FI STAFF

Fully $490 per week—that is the good round saving Lehigh Valley Dairy, Allentown, Pa., estimates it is making following its change-over from cake to liquid wax in the paper-carton forming and coating machines.

The company has found that its use of the liquid-form product has brought benefits in efficiency as well as in lower cost of operations. The greater the volume of wax used, the greater the advantages. Liquid wax, in tank-truck lots, costs about 22 percent less delivered than the wax in cakes. And labor required for operating the liquid wax system and packaging machines is only 40 percent of that needed when cake wax is employed.

Now, just what did this "switch" involve?

First off, there were the special provisions for handling and storing the wax in the liquid state. It is delivered by the tank trucks (at 160 deg. F.) and flows by gravity, through a 4-in. traced and insulated pipe, to two temperature-controlled, coil-heated, insulated storage tanks. Capacity of each tank is 50,000 lb.

When the paper-bottle machines are in operation, liquid wax is pumped from the bottom of either storage tank to the steam-coil-heated reservoirs of the machines. The system is dual and interlocking. The two pumps are steam-jacketed, positive displacement, with adjustable strokes to increase capacity within a given range. This provision was made to allow for the installation of additional machines.

Wax levels in the reservoirs are not controlled by float valves. Such controls were found to be unsatisfactory because of limited space in the reservoirs, and also because the intermittent action of the machines violently disturbs the liquid. Therefore, hand control valves are used. When machines are in operation, these valves are "cracked" to provide a small continuous flow. Whenever the supply from the proportioning pumps is in excess of the needs of the packaging machines, a relief valve opens and returns excess wax to the storage tank from which it was pumped.

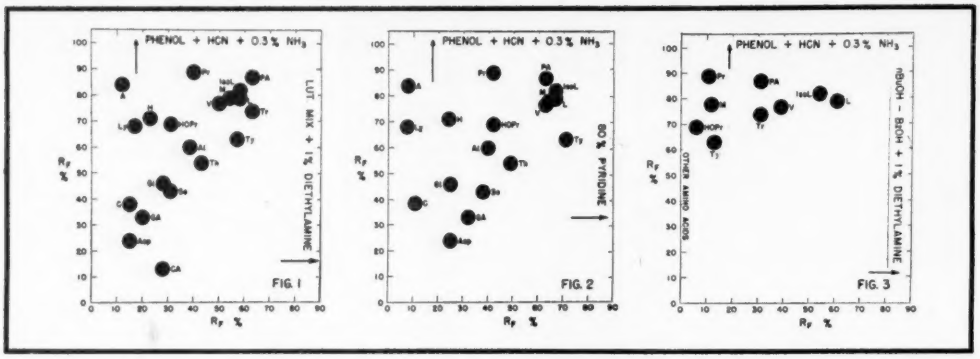
Master Valve Protects Pumps

When switching from one storage tank to another, there is always the possibility that the hand valve controlling the return will be closed before the other is opened, or that both valves will be left closed. To insure against this, an emergency, or master relief valve, is installed on the main delivery line supplying wax to the packaging machines. This valve cannot be closed out of the system. It is set to open at a pressure slightly above that of the tank relief valves. When it opens, the wax discharges into a small container.

Precautions must be taken, however, to prevent the overflow from this container from running into the floor drain. To accomplish this, a wooden plug, with handle, is kept in the drain at all times, except when the floor is being washed.

Liquid wax is very difficult to confine when hot and fluid. For this reason tight, liquid ammonia type valves are used, all pipe joints are welded, and all valve joints are brazed. A $\frac{3}{8}$-in. outside diameter copper tube is employed for the steam tracer which follows each wax line. The tubing is wired to the lines and spiraled around each valve. Wax lines and steam tracer lines are insulated by 1-in. of magnesia.

Patterns like these "put finger" on aminos



VARIOUS amino acids, represented by dots above, move along paper strips for distances directly proportional to solvent movement. Fig. 1: Location of 20 amino acids on two-dimensional chromatogram as calculated from one-dimensional run. Fig. 2: Use of 80 percent pyridine, instead of diethylamine, gives better separation for most acids. Fig. 3: Employment of butanol-benzyl alcohol separates leucines, valine and methionine.

Paper Chromatograms Spot Amino Acids

Two-dimensional microseparation patterns quickly identify them—or other substances—in a mixture. Added tests give concentrations

RICHARD J. BLOCK

Dept. of Biochemistry, New York Medical College, New York City

All the usual amino acids in a food mixture can now be readily determined by a modern method—two-dimensional paper chromatography. And with certain adaptations of the chromatograms, these findings can be not only qualitative, but also quantitative.

Development of present-day paper chromatography stems from a line of investigations made by Martin, Synge, and their co-workers, about 1941. They were interested in developing a continuous liquid-liquid counter-current method for the separation of substances with very similar solubility coefficients between two immiscible solvents. But they did not succeed.

Martin and Synge* in their earlier studies attempted to separate amino acids on silica gel columns. They found this unsuccessful, due to the degree of adsorption on the silica gel of the free amino acids. In their search for a material which would hold water and yet have a lower degree of adsorption than silica gel, they used filter paper which will absorb up to about 22 percent of its weight without a wet appearance.

These investigators placed a very small drop (0.01 ml.), a few centimeters from the end of a strip of filter paper, allowed the drop to dry, and then dipped the lower part of the strip of paper into a water-saturated immiscible solvent. The remainder of the strip was allowed to hang down from the raised solvent-containing trough. In order to keep a constant atmosphere, the whole apparatus was enclosed in a bell jar.

Acids Revealed

At the end of the chromatographic run, the amino acids were revealed on the paper by spraying with a solution of 0.1 percent of ninhydrin (triketohydrindene hydrate) in n-butanol. Martin and Synge observed that various amino acids moved along the paper strip a distance which was directly proportional to the distance which the solvent had moved. Thus, for instance, if the solvent (phenol-saturated with water) had moved 50 cm. from the point of application of the amino acid mixture, leucine would show up on the paper at about 40 cm. from its original point of application, and glutamic acid would have moved about 15 cm.—i.e., the leucine would have traveled approximately 80 percent of the distance moved by the solvent, and the glutamic acid approximately 30 percent.

The ratio of movement of amino acids to distance of movement of solvent was largely independent of the distance traversed by the solvent. They designated the ratio thus found as the R_f value of a specific substance for a specific solvent.

In this manner the R_f values of any substance capable of detection on filter paper can be found with a great variety of solvents. And so, the identity of a substance in an unknown mixture may be determined by comparing its R_f values in a series of different solvents with that of a known substance. Furthermore, it was noted that the R_f values of a homologous series of compounds would often themselves be homologous.

Materials Identified

This observation has permitted, in many instances, the identification of materials in natural products heretofore unsuspected.

Martin and Synge originally claimed that paper chromatography was primarily partition chromatography and that, as a consequence, only water-saturated immiscible solvents would give clear-cut separations on filter paper. We, as well as other investigators, have found that completely immiscible solvents may be used with equal success.

In the case of water-saturated immiscible solvents, temperature usually

* Martin, A. J. P., "Partition Chromatography," in *Annual Reports of the Progress of Chemistry*, 1928. The Chemical Society, London, 1949.

has a marked effect on solubility of water in the organic solvent and, therefore, the absolute rate of movement of an amino acid with respect to the flow of solvent will vary with the temperature. That is, the higher the concentration of water, the farther the travel of each amino acid.

However, the distance traveled by each amino acid with respect to the others remains remarkably constant over a rather wide temperature change. This means that although the absolute partition coefficients may be greatly changed, the ratios of the partition coefficients of the respective amino acids are almost unaltered.

The above mentioned R_f value, then, is a numerical expression which is very constant for each solute under uniform experimental conditions—type of paper, temperature, solvent, and, to a lesser extent, solute concentration. Many investigators in this field identify amino acids and other substances primarily by their R_f values.

Our own experience suggests that greater reliance should be placed on simultaneous controls wherever possible. The R_f values for amino acids vary considerably, depending upon the type of filter paper used. And, in fact, they vary somewhat from batch to batch of paper. Although the order of magnitude of the value is the same with different papers, there are significant variations in both the absolute and relative amounts with different types of filter paper. Thus, in approaching a new field of paper chromatography it is highly desirable to ascertain the effect of a number of types of filter papers, because separations may be achieved with one type of paper that are not possible with another.

Patterns Established

The relative positions of each amino acid on the finished chromatogram will depend on the solvent system used. Development of the chromatogram in one direction is called a one dimensional chromatogram. However, if after the development in one direction, with one solvent system, the solvent is removed and the paper is rotated through 90 deg. and another solvent system is allowed to run at right angles to the original direction, then a two-dimensional chromatogram is produced. Here, the amino acids are distributed throughout the sheet, in a specific pattern rather than in only one dimension.

In 1943, Liesegang briefly described this method, calling it a "cross capillary analysis." In columns, a comparable separation of solutes can only be achieved by the transfer of extracts of various sections of the absorbent column or fractions of the eluate to a fresh column and rechromatographing with a new solvent system. The two-dimensional chromatogram thus shows a great advantage over any other chromatographic system. In 1948, the need for such a technic was ably demonstrated graphically by Dent.

The experimental modifications of the method developed by Consden, Gordon and Martin in 1944 are probably legion, since it seems that practically every investigator entering this field has added innovations, although the majority of these seem to have been anticipated by Goppelsroeder back in 1901.

Aquarium Proves Convenient

We have been using, for the past four years, rectangular glass aquaria (see photo) 52 cm. long by 32 cm. high by 26 cm. wide (which may be purchased at any pet shop). The lower portion of the sides and all the joints are covered by a layer of paraffin. Two glass rods running the length of the chamber are paraffin sealed to the end walls of the chamber about 5 cm. from each side wall and 2 to 3 cm. from the top. A third rod is sealed mid-way between these two and the same distance from the top.

Glass troughs are made by sealing the ends of 2 in. pyrex tubing cut longitudinally down the middle. The chamber is covered by a heavy glass plate and pressed down to make a seal with a lead weight.

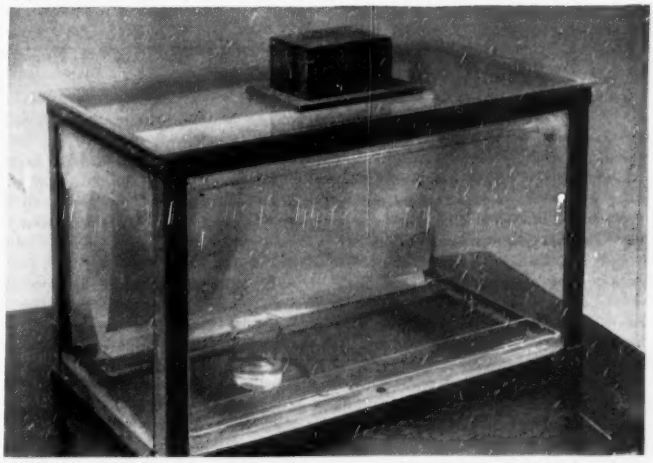
In operation, three sheets of filter paper 17 to 19 in. wide (or smaller) by 19 to 22 in. long are cut. The unknown solution is applied as drops about 2.5 cm. from the bottom of the sheet and 2 to 3 cm. apart, and the wet spots are air dried. The troughs are filled with from 20-50 ml. of developing reagent, depending on the type of filter paper, and the chamber is covered with the heavy glass plate.

The solvents climb by capillary action up the paper (ascending chromatography) then past the support rod and down the other side (descending chromatography). The transparency of the chamber permits observation of the progress of the solvent at all times and without disturbance. The atmosphere within the chamber can be replaced with illuminating gas, nitrogen, or others as desired, and a beaker containing NH_4OH, HCN, diethylamine, etc., may be placed in the central part of the chamber, if necessary to provide a better atmosphere for development of the chromatogram. Excess solvent in the glass troughs serves to keep the atmosphere saturated with respect to the reagents and water.

Three 19 x 22 in. sheets can be run in each chamber at the same time—i.e., six one-dimensional runs or three two-dimensional runs in each chamber. For two-dimensional runs, the unknown solution is put on the paper at a point 3 cm. from each edge, and then carried through the procedure described above.

A substance that is to be chromato-

Apparatus is simple and progress can be watched



GLASS AQUARIUM, covered by plate-glass top held down with lead weight, provides test chamber. Pyrex tubing, cut longitudinally, forms developing troughs. Filter paper is hung over glass rod, with one end of paper extending down into trough. Atmosphere in chamber can be replaced with illuminating gas, nitrogen, or others, and a beaker containing NH_4OH, HCN, diethylamine, etc., may be placed inside if necessary to provide the better atmosphere for development of chromatograms.

graphed should be put on the paper in as small a volume as convenient. We use 0.01 and 0.005 ml. routinely. If large amounts of liquid have to be used, the liquid should be put on the paper with small drops, drying after each application with a stream of hot air, or an infra-red bulb. Last year, Urbach described an arrangement for the deposition and simultaneous concentration of dilute solutions in paper partition chromatography.

Many Solvents Tested

The number of water-saturated solvents that might be used is obviously very great. In our laboratory, we have tested some 40 to 50 different solvent mixtures and found the following most generally useful for the separation of amino acids from protein hydrolysates:

1. Water saturated phenol in an atmosphere of coal gas, moistened NaCN and 0.3 percent NH_3. It is employed for the separation of alanine, threonine, glycine, serine, cystine, glutamic, aspartic, and cysteic acids in one-dimensional chromatograms. As yet no substitute has been found that will work as well as phenol for the first solvent in two-dimensional resolutions, Mallinkrodt's liquified "Gilt label" product is most satisfactory and is used without purification.

2. Ethyl alcohol, water and 2,6- lutidine in the proportions of 20:25:55 in the presence of a little diethylamine. This is another useful reagent. The amino acids in this solvent have a considerably different distribution than with phenol, and thus two dimensional runs with phenol in one direction and the lutidine mixture in the other have proven of greatest value in general exploratory work. Almost every amino acid can be separated on such a chromatogram, except for leucine from isoleucine.

3. Butanol—glacial acetic acid, (10:1), in an atmosphere of 0.3 percent NH_3 again, this shows a somewhat different distribution in the resolution of the faster moving amino acids. With this mixture, the spots or bands are particularly sharp and therefore most useful for quantitative measurement or for cutting out.

4. Sec. Butanol, tert. butanol, and water, (4:1:3). This has the same general characteristics as the butanol-acetic acid mixture, in addition, separation of the slowest moving components from the intermediate moving amino acids takes place.

5. Ethanol (77 percent). Using this, a good general distribution of the amino acids is shown throughout the chromatogram. It is easily removed from the paper and in particular separates histidine, hydroxyproline and proline very nicely when used in a two-dimensional chromatogram. Histidine and hydroxyproline sometimes overlap in some other solvent mixtures.

6. Pyridine (80 percent). This affects a group separation which can then be resolved with other solvents.

7. Benzyl alcohol and n-butanol, (1:1), in an atmosphere of diethylamine. This effects a separation of amino acids that usually move as a group in other solvents—i.e. leucine, isoleucine, valine, methionine and phenylalanine—and is used when confirmation of their presence is necessary. A mixture of isobutyric-isovaleric acids (1:1) has been reported by Edman to be especially valuable for the separation of leucine and isoleucine.

By judicious combination of the above solvents in two-dimensional chromatograms, and with the help of specific tests for individual amino acids, all the usual amino acids can be identified in a mixture by paper chromatography. Fig. 1 shows the expected location of 20 amino acids on a two-dimensional chromatogram as calculated from one-dimensional runs. Fig. 2, with 80 percent pyridine instead of the lutidine mixture, indicates somewhat better separation of all the amino acids, except for the leucines, valine and methionine.

In order to separate the latter group, the butanol-benzyl alcohol mixture in an atmosphere of diethylamine is used (Fig. 3). An example of another two-dimensional chromatogram would be about 0.1 mg.N of hydrolysed casein

How British Use It

Chromatography has been used by British food researchers to isolate and identify the individual starches present in cells of plants, and the pigments which give natural products their characteristic colors. At Torry Research Station, Aberdeen, Scotland, it has been used to identify particular constituents of wood smoke which are responsible for curing of fish. And it has been used to investigate presence of lysozyme in egg white, a germ dissolving enzyme.

Milestones In Development of the Method

The separation of various compounds by selective adsorption has been practiced for over 150 years. As early as 1773, Scheele described the adsorption of gasses on charcoal. In 1785 Lowitz found that charcoal took the coloring matter out of solutions, and at the end of the 18th century the adsorption method was satisfactorily used industrially in the preparation of sugar.

One of the first to experiment in isolating labile substances from mixtures was Danilewski, who in 1862 succeeded in separating amylase from trypsin in pancreatic juice by means of adsorption on freshly precipitated collodion. Probably the first use of adsorption phenomena for analytical purposes can be credited to Schoenbein, who in 1861 proposed the use of starch-potassium iodide paper for the detection of ozone, although lead acetate paper for detecting hydrogen sulphide had been described in textbooks as early as 1850. Schoenbein also realized that selective adsorption of the solutes in a solution was taking place at the different heights to which they rose when a strip of filter paper was dipped into a solution containing a mixture of substances.

It was Goppelsroeder, a pupil of Schoenbein, who deliberately took advantage of this selective adsorption to devise a method of capillary analysis which he claimed would detect 10^{-11} g. of methylene blue in 1 ml. of solution. Goppelsroeder's first papers were published in 1861, and 40 years later he published a monograph on capillary analysis.

According to this method, one end of a strip of filter paper is placed in a solution containing the substances to be resolved. As the liquid is drawn into the filter paper by capillary forces, the substances in solution gradually separate from one another to form a series of bands on the paper. The rate of flow of the solvent into the paper strips can be increased by hanging them over the edge of a vessel containing the solutions in question. The bands may be farther separated from one another by placing the paper strips in a portion of fresh solvent after some of the solution has been adsorbed.

Goppelsroeder applied his "capillary analysis" method to the investigation of alkaloids, oils, petroleums, beverages, foods, urine, bile, and other naturally occuring mixtures. Because the preparation of materials in quantity is virtually impossible, the method of capillary analysis *per se* has found little use in biochemistry but has been employed extensively by dye chemists and, to a certain extent, in forensic medicine.

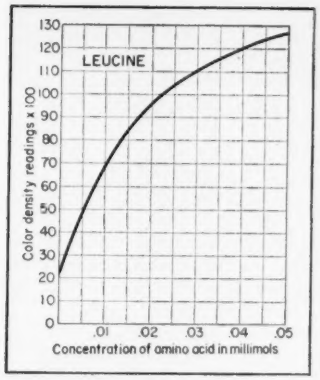


CHART shows how color density alone may be used to check amino acid concentration.

run with phenol and with the lutidine mixture.

Wherever possible, absolute identification of a spot should not rest solely on the R_f values. In our experience, the position of the spot relative to the other amino acids is most reliable. All the amino acids are revealed by spraying the dried paper with a solution of 0.1 or 0.2 percent of ninhydrin in butanol, isopropanol, etc. Proline gives a yellow spot, hydroxyproline an orange spot, but all others give blue, purple, or reddish-purple spots. Dent also warns against reliance on R_f values for identification.

As far as feasible, the identity of a spot should be confirmed by its movement in a variety of solvent mixtures and by the application of specific tests. During the course of years, a great many color reactions have been developed for certain amino acids (Block 1945). A number of these have given satisfactory results when the developing solvents are removed from the paper. The following amino acids may be identified:

1. Arginine and other guanido compounds, by the Sakaguchi test. The paper is sprayed with 0.1 percent a-napthol in N NaOH followed by NaOCl (Chlorox).

2. Histidine, tyrosine, and other phenol and imidazole compounds, by the Pauly reaction—i.e. freshly diazotized sulfanilamide in n-butanol is sprayed on the paper and then after 5 min. drying in the air, the color is developed by spraying with a solution of water-saturated Na_2CO_3. No confusion is possible between histidine and tyrosine, since they have decidedly different R_f values in almost all solvents.

3. Tryptophan and other indoles, by Ehrlich's reagent. This amino acid is destroyed during acid hydrolysis, and therefore the absence of a spot after acid treatment is indicative of its presence in an alkaline hydrolysate. It may be detected by spraying the paper with 1 percent of p-dimethylaminobenzaldehyde in 5 percent HCl.

4. Glycine, giving a green color when sprayed with ortho-phthalaldehyde.

5. Proline and hydroxyproline, giving an intense blue color after spraying with 0.2 percent isatin in butanol-4 percent galcial acetic acid. The hydroxyproline color is weaker and greenish and the other amino acids may give faint pink colors. The two

(*Turn to page* 217)

Infestation of Packaged Products Checked by Pest-Proof Wrap

Formed of DDT-impregnated multi-layer wadding, it kills insects before they can penetrate goods

A. G. THOMSON
London, England

Faced with the problem of reducing wastage of packaged food due to insect infestation, the Pest Infestation Laboratory, Slough, England has come up with an inexpensive, easy-to-handle pest-proof packaging material—cellulose wadding impregnated with DDT.

This new flexible, insect killing material is reported suitable for wrapping small, individual packages packed in shipping containers. Applied in this manner, it should have a wide range of applications for packaging foods exported to tropical or sub-tropical areas.

Attention was first directed to the problem during the war, when insects were responsible for considerable wastage of foods dispatched to the troops. After the war, inquiries were received from firms who sought to keep insects out of commercial packaged goods.

Making an insect-proof material is relatively simple, but to make one that is suitable for practical use is not so simple. Before the problem was solved, four attempts were made. They may be evaluated as follows—

FAIR: The laboratory's first attempt to achieve an insect-proof wrap was made with a cardboard sheet glued to sandpaper—the idea being that boring insects would find it impossible to penetrate the hard surface. The idea was feasible, but it proved difficult to bend the material around packages without leaving cracks, through which insects could easily penetrate.

BETTER: Next, a paper impregnated with DDT was tried. And it was found to be an improvement. Even so, some insects could bore through it. And while the insect making the first penetration might pick up enough DDT to kill it, others could then safely pass through the hole.

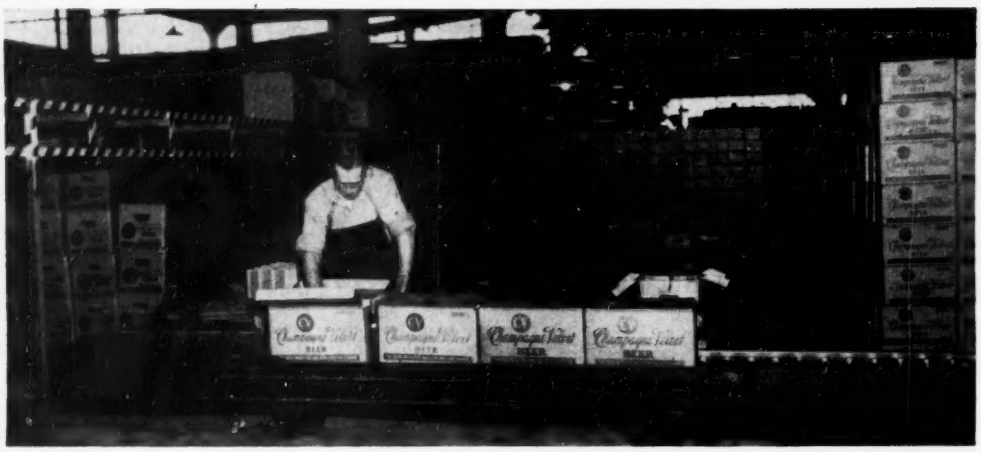
STILL BETTER: A third method —use of corrugated cardboard impregnated with DDT—was then tested. The object here was that if insects, which invariably make for a tunnel, should get through the outside layer, then they would wander along the tunnels inside, picking up a lethal dose of DDT.

Trials showed that the investigators were on the right track. But some unexpected difficulties were encountered. Small insects did not realize that they had gone into a tunnel and went straight through the opposite wall into the contents of the package. And larger insects were too big to travel along the tunnels.

BEST: Then use of several very thin layers of cellulose wadding impregnated with DDT proved to be the optimum solution. The idea here was to substitute a softer, flexible material for the rigid cardboard. And laboratory tests with seven different types of insects proved this effective.

Thickness of the waddings range from 4 to 20 layers. Each layer is made of paper pulp spread so thinly that it constitutes a network of tiny holes and tunnels. The paper is slightly crimped so that if insects penetrate the carton they wander in the "labyrinth" for some time and die before making any penetration.

Due to the flexibility of the wadding, no wrapping difficulties are encountered. Another advantage of this wadding is that it does not have to be sealed around the packages. As long as there is a fairly large overlap, insects that get in will die long before getting through—even if they go straight between the folds of the overwrap. This means that the wrapping can be done easily, quickly, and efficiently by unskilled labor.



CONVEYORIZED CASE HANDLING makes possible a 1½-hr. bottling cycle at plant of Terre Haute Brewing Co. Shown is inspection station on second floor where "exchange" and broken bottles are removed and replaced.

Three Roads to Cost Cutting

This Indiana brewery "took all three"—and realized new efficiencies in operating existing equipment, in materials handling, and in plant construction

IVAN C. MILLER
Editorial Consultant, "Food Industries"

During the last few years, the Terre Haute (Ind.) Brewing Co. has decidedly cut costs by a three-part program: (1) Increasing the efficiency of existing equipment, (2) speeding operations through mechanization of materials handling, and (3) introducing economies in construction without sacrificing building efficiency.

First, the matter of air power: It has performed an increasingly important function in the operations of this brewery. It is used for wort aeration, for supplying counter pressure in stock tanks, for operating stirrups on filling machines in the bottling plant, and for operating control instruments used in processing. A centralized compressor plant supplies this air power, which is also used for cleaning and dusting, for operating maintenance and repair department air tools, and for the needs of the automotive repair shop.

Plant capacity, which has been expanded rapidly to a current 1,500,000 bbl. per year, greatly increased the load on the three central station compressors. Present demand is for 600 or more cu. ft. of air per min. at 80 to 90 psi.—an increase of 40 to 50 percent over installed capacity.

The Terre Haute company obtained this increased air output with an investment of only about $1,200. To do it, a 50-hp. centrifugal-type booster compressor was installed on the main air suction line. This booster, feeding the original compressors the required volume of air at approximately 8 psi., increased their output by the needed 40 percent. A similar arrangement has also increased the capacity of the carbon dioxide compressors.

Air Cleaners Added

Addition of other auxiliary equipment for cleaning and purifying the air before and after compression has increased efficiency as well as capacity. This equipment is rapidly amortizing itself through a saving in compressor repair and maintenance. And, at the same time, it has improved quality control. First step was to remove dust particles from the air which supplies the compressors. This was accomplished effectively by glass wool filters installed on the plant's roof, through which all air for compressing passes. The second step was removal of oil picked up during compression.

A large part of the compressed air is used to maintain counter pressure on the stock tanks, which have a total storage capacity of approximately 200,000 bbl. of beer. If oil is carried to these tanks, a costly loss is incurred.

Before the installation, lubrication of compressors was kept at an absolute minimum to prevent oil carry-over. This resulted in high maintenance and necessitated a complete overhaul of each compressor at least once every three months. Little maintenance is now required and overhauling is done annually. Lubrication of compressors need not be curtailed.

The air purification system operates as follows: Dust is removed from incoming air by the glasswool filter, then the air is compressed to 8 psi. in the new centrifugal-type booster compressor. Between this compressor and the two reciprocating compressors is a surge tank for further removal of impurities. After leaving the reciprocating compressors, the air is cooled in a water cooler, where a portion of the oil is separated and removed, then enters the special oil removal drum.

Direct expansion ammonia coils spiral around the outside of this drum, producing a cold-wall for the condensation and removal of any remaining oil. Separated oil collects in the bottom and is drained off periodically. After leaving the drum, the air is again filtered before it is used in processing.

Points now on materials handling

savings: For years the brewery bought carloads of malt and cereal in bags which were unloaded and trucked to the elevator by hand, lifted to the top floors of the brew house, and dumped into intermediate storage bins or stacked in warehouse space. Today, malt or grain is shipped in bulk, and unloaded by an "Airveyor" system, which lifts the grain by air suction to a distributing hopper at the top of the brewhouse. From here the grain flows either to intermediate storage bins or to one of two 20-car capacity steel tanks. Grain or malt from the steel storage tanks is drawn into the brewhouse by the same air conveying system.

The system is dual and interlocking. Cars can be emptied at the same time that grain is drawn from the steel storage tanks. Moreover, grain and malt can be transported simultaneously with no danger of mixing.

This mechanized system has advantages other than the saving in operating cost. The steel tanks have increased the storage capacity—a big advantage since it was thus possible to convert warehouse space into much needed processing space. Mechanical handling of grain has reduced the labor required for unloading and warehousing by more than 80 percent and has reduced the labor of processing, too. The present system is also much cleaner. The steel tanks are rodent proof.

Before the system could function efficiently and safely, however, two problems had to be solved: The hopper which received the grain from the cars or storage tanks was located on the top floor of the brew house (the only space available). Flow to intermediate storage bins on the floor below, or to the steel tanks, was by gravity through conventional round metal pipes or ducts. Because of the location of the hopper and storage bins, the slope of some of the ducts could not be increased over 30 deg. from the horizontal. But this was not enough to prevent the grains from clogging in the ducts.

Rectangle Beats Circle

However by replacing the round ducts with rectangular ones, approximately 12 in. on the bottom and 6 in. high, this trouble was eliminated. Grains which clogged in the round ducts slide in a continuous stream down the rectangular ones sloped at the same angle.

Grains on an inclined flat surface, or in a rectangular duct, move in one direction—the direction of the slope. Down a circular duct, however, flow is in two directions—in the direction of the slope of the duct, and also down the circumference toward the bottom of the circle. This dual flow causes the grains to pile up and clog in the round ducts. This does not happen in the rectangular ones.

When the central distributing hopper was installed, for receiving both malt and grains and discharging each to the proper bin or tank, conventional valves were used in the distributing ducts. Applied to the new system, these proved confusing to operators, and unintentional errors occurred. Mixing malt and cereal, or delivering either to the wrong place can be a costly mistake. To overcome this, company engineers designed special valves, and these now function effectively and minimize errors. In these units, the lever arms, which are outside the rectangular ducts, are directly above the gates on the inside. Tension, from a strong spring, locks the valve gate in place so that only one of the ducts can deliver grains at a time.

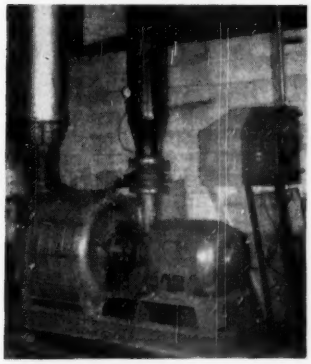
Mechanized handling of finished products in the bottling house has also been made more efficient, and brought reduced operating cost. Objective of this mechanization was to reduce the need for in-plant storage of empty cases. This was accomplished through installation of an almost fully automatic, continuous production line to speed up inspection, washing, filling and labeling. Cases of empties can now enter the bottling plant and be washed, filled, capped and labeled on a 1½-hr. time cycle, and at a rate of 150,000 cases per day.

Empty cases, returned in railroad cars, enter along one side of the bottling house on any one of seven conveyors feeding the main trunk line. And trucks can discharge loads at any one of eleven stations along another side of the bottling house. The same materials handling system loads or unloads trucks or railroad cars with a minimum of manual control. As soon as a truck is emptied it can be loaded with filled cases at the same station by the same conveyor system. This arrangement reduces traffic conjestion and conserves man-hours.

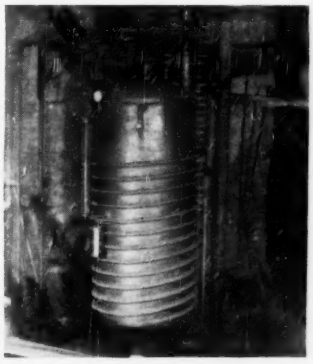
Incoming cases of empties are conveyed to the second floor for inspection. Inspection begins at the merry-go-round where case separation is made—quarts from pints, green bottles from brown—and the cases are directed either to the old bottling house or the new, acording to requirements. At the inspection stations, "exchange bottles" and broken bottles are removed and replaced.

All broken glass is collected in cartons discarded by the carton inspection department. When filled, these travel along a separate conveyor system to

Road 1—New Unit Efficiency



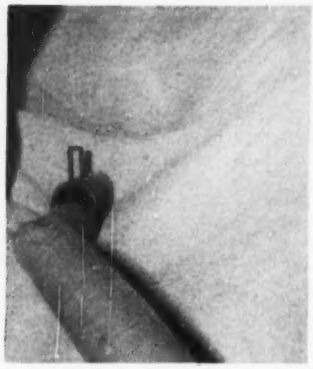
CENTRIFUGAL UNIT that pre-compresses incoming air to 8 psi. This operation has almost doubled output of original compressors.



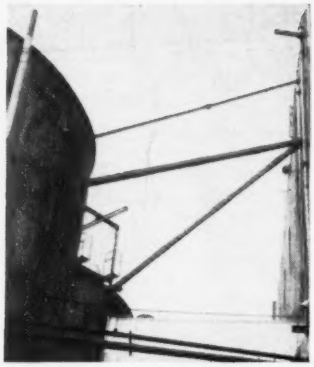
COLD-WALL CONDENSER has eliminated oil carry-over in compressed air. This reduced compressor maintenance more than 75 percent.

GLASS WOOL FILTERS on plant's roof, through which all air passes, remove dust particles from the air before it is compressed.

Road 2—Mechanized Materials Handling



SUCTION is used to lift incoming raw materials to 90 ft.-high distributing hopper.



RECTANGULAR METAL CHUTES convey grain from distributing hopper to storage tanks.

trash disposal bins outside the plant.

Cases of inspected bottles travel via a four-deck conveyor to the bottle washing department on the floor below. When bottles are removed from the cases at the washers, empty cases are returned, by the same continuous conveyor system, to the second floor for inspection. Here any trash is removed and defective cartons or separators are discarded. This material also travels to the trash disposal bins by the separate trash conveyor system. Acceptable cartons leave inspection on the same conveyors and are delivered to the case-filling machines on the first floor. The separate disposal system has reduced trash collecting and removal costs, lowered the accident hazard, and improved housekeeping in the bottling department.

The multi-deck conveyor system—fully 3 mi. long—operates almost automatically. Mechanical traffic directors, "traffic cops", prevent cases from jamming at intersections of conveyors by stopping one or the other line, depending on which is first to deliver cases to the intersection after an interruption. This system has decidedly cut bottle house operating costs.

Another cost cutter is the use of liquid caustic soda for bottle washing. Before this was adopted, a washing solution was prepared by mixing water and solid caustic soda. Caustic is now delivered as a standardized solution in tank cars and is pumped to storage and drawn as needed to replenish or strengthen the solution in the washers. Use of liquid caustic reduces a serious accident hazard, reduces the cost of washing solution make-up, and assures a wash solution of uniform strength.

Finally, new economy and efficiency have been realized through astute construction. The new beer-storage building houses 28 glass-lined storage tanks, each of approximately 750 bbl. capacity. These tanks are arranged in two decks, all tanks resting on two common footings. The latter extend the length of the building (160 ft.) but are independent of and separated from the building floor.

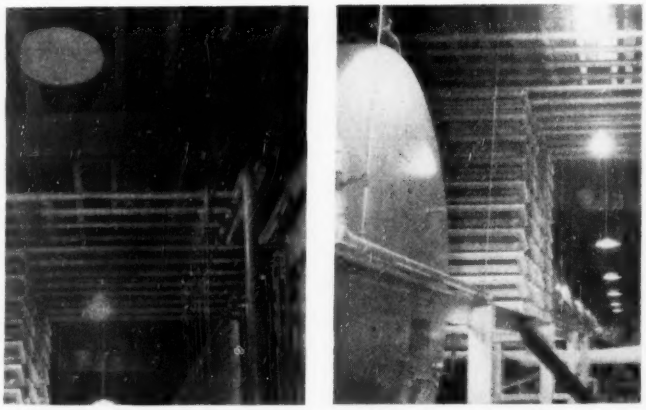
MULTI-DECK CONVEYORS—3 mi. of them—use mechanical "traffic cops" to prevent jamming of cases.

This new building straddles what was once a canal, long since filled up. When the building was planned, it was anticipated that the weight of the filled tanks on the footings (several thousand tons) would result in settling. This would have ruined the floors had not the footings been designed so that they could settle separately, independent of the floors. As a matter of fact, the footings have settled slightly, as was expected, but without any injury to the building floor.

Storage tanks are arranged in two double-deck groups of 14 tanks, each group separated by an air well. An 11,000-ft. long refrigeration coil, fabricated at the brewery, is suspended at the top of this well about 5 ft. from the ceiling. This arrangement provides a thermo-cycle movement of cold air to blanket the tanks sufficiently to maintain the desired temperature for the stored beer.

Walls of the building are insulated. As for the roof, this is painted black inside to absorb heat and covered with sheet aluminum on the outside to reflect it. The company reports midsummer temperature just under the roof of 65 deg.; at the top of the refrigeration coils, 2½ ft. below the roof, 36 deg.; and at the floor level, 10 ft. below the coils, the requisite 32 deg. Accordingly, the brewery maintains that its economy, effected in this type of roof construction, has not impaired refrigeration efficiency.

Road 3—Planned Construction



STRUCTURAL THINKING is exemplified in new beer storage building. Here, ceiling (left) is painted black, with roof covered with aluminum. Owners say this has provided efficient insulation. The glass-lined storage tanks (right) get better support from outside footings independent of floor.

Meat's Color Also Shows Contrasting Effects

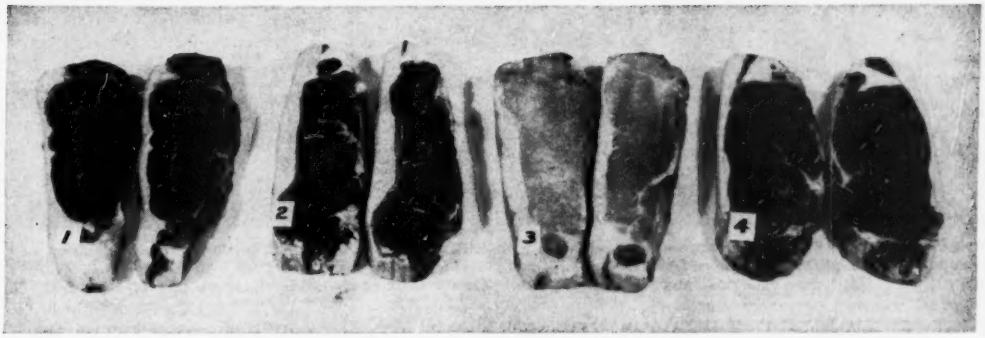


FIG. 1: (1) Not frozen. (2) At —20 deg./ 1,500 fpm. air blast. (3) At —110 deg./ dry ice. (4) At 20 deg./ still air.

Freezing Time of Your Meat Depends on What's In It

Moisture and fat content and thickness are major factors. Also temperature, air velocity, and packaging materials. And freezing time, in turn, largely determines size and location of ice crystals and color of the final product

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Swift & Co. Research Laboratories, Chicago

Studies carried on in Swift & Co. Laboratories over a period of a year have identified and evaluated the numerous factors that affect the freezing time of meats. These results demonstrate that:

- **Beef rounds frozen in an air blast at —25 deg. F. contain ice crystals ranging in size from small within the fibers of superficial lean to large between the fibers at a 4 in. depth.**
- **Meats containing a high percentage of fat tissue freeze more quickly than those containing very little fat tissue.**
- **Beef, lamb, pork, and veal freeze at similar rates when allowances are made for differences in their fat and moisture content.**
- **Aging and grinding of beef does not significantly change its freezing rate.**
- **The freezing time of meat is progressively decreased by increasing the velocity of the air from less than 50 ft. per min. (natural air movement) to 200 ft. per min. and to 500 ft. per min. But the freezing time is not materially changed by increasing the air velocity from 500 ft. per min. to 1,500 ft. per min.**
- **The freezing time of meat is increased with any increase in the insulating value of the package.**

As early as 1922, the importance of various factors influencing the freezing time of meats was recognized.[1] Factors affecting the time of cooling were grouped into two classes: Internal—depending upon the nature of the cooled substance; and external—depending upon the properties of the external medium.

Internal factors include thermal conductivity, specific heat, latent heat, specific surface, and nature of surface of the cooled body. External factors include the temperature, conductivity, specific heat, density, and degree of agitation of the external medium.

Many methods of freezing meats are used. They include: (1) in air with natural movement, (2) in air blast, (3) in direct contact with refrigerated plates, and (4) by immersion in, or spraying with, sodium chloride brine, or other solutions. Consideration will be given here to pertinent reports (by Birdseye[2], Meek and Greene[3], Du Bois and Tressler[4], and Tressler and Evers[5]) in which freezing rates, advantages, and limitations of different methods are discussed.

Moving air temperatures used in freezing and storing meat have been progressively lowered during the past 40 years, by virtue of improvements in refrigerating equipment and insulation. The recognized need for lower temperatures, as a means of retaining good quality, provided an incentive for these developments. Temperatures of 15 deg. F. were used commercially for freezing and storing meats until 1908 or later[6], whereas conditions now recommended for freezing meat call for air temperatures of from —10 deg. F. to —50 deg. F. and often include rapid movement of air. For storage of frozen meats, temperatures of 0 deg. F. or lower are now recommended.

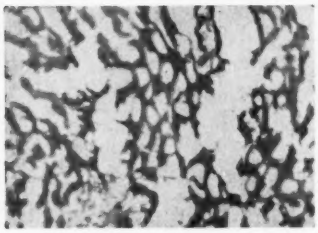
If beef which has been frozen at an ambient air temperature of +15 deg. F. is compared with similar beef frozen at —15 deg. F., the following advantages will be found in the latter product: (1) Lighter and more desirable color in the frozen state, (2) greater retention of meat juices on thawing, and (3) more firmness and better keeping qualities on thawing.

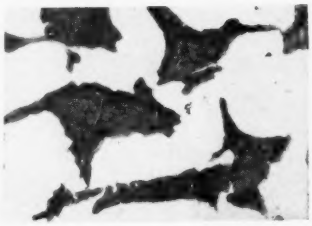
In addition to these advantages, Hiner and associates' have reported that freezing, particularly "quick-freezing," materially improves the tenderness of meat.

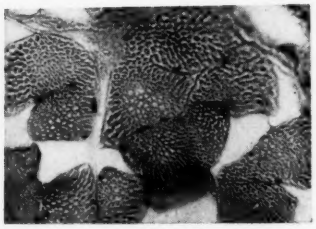
Freezing Rate and "Quick-Frozen" Meats

There is considerable difference of opinion as to how quickly meat must be frozen to be classified as "quick-frozen." According to Moran[8], meat is "quick-frozen" if it is chilled through

Here's a Magnified Look at Crystals







VARYING ice crystal formations are contrasted here, with **FIG. 2** (left) showing them formed in outer ¼ in. of beef round frozen in 1,500 fpm air blast at —25 deg. **FIG. 3:** (center) shows same round at 4 in. depth. **FIG. 4:** Beef loin, ½ in. thick, frozen in liquid nitrogen at —320 deg. Magnification of Fig. 4 is 4½ times that of Figs. 2 and 3.

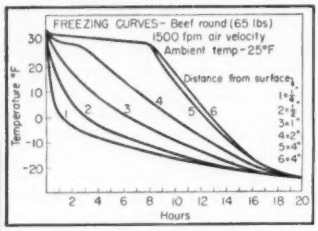


FIG. 5. Beef rounds of ¼ in. need about 1/10 as much time to freeze to 0 deg. F. as do 4 in. rounds.

the temperature range of from 41 deg. F. to 23 deg. F. in ½ hr. or less. Poole[9] states that meat is "quick-frozen" if its temperature drops from 31 deg. F. to 25 deg. F. in 25 min. He describes this temperature range as the zone of maximum ice crystal formation.

The influence of the rate of freezing on size and location of ice crystals in meat was studied by Plank[10] as early as 1916. Since then, many reports on this subject have appeared. It is now well known that size and location of ice crystals in frozen meat depend in a large measure on the rate at which the temperature of the meat is dropped from just above the freezing point (29.5 to 30 deg. F. for beef) to a temperature of about 25 deg. F. Small intra-fiber ice crystals are characteristic of quickly frozen meats, while large extra-fiber ice crystals are typical of slowly frozen meats.[11]

There are, however, exceptions to this rule. For example, when beef steaks were frozen at an ambient air temperature of —30 deg. F. within a few hours after slaughter of the animal, the ice crystals were very small and located within the fibers. When similar beef was aged for a month before the steaks were cut and frozen at —30 deg. F., the ice crystals were very large and located between bundles of fibers.[12]

In the study reported here, the relationship of the rate of freezing (at various points within the cut of meat) to ice crystal size was determined. For this purpose, a beef round was frozen in air at —25 deg. F. with air velocity of 1,500 ft. per min. Thermocouples were located at distances of ¼, ½, 2, and 4 in. from the surface. Freezing curves are shown in Fig. 5.

If it is assumed that "quick-frozen" meat must chill through the temperature zone of from 31 to 25 deg. F. within 30 min., beef at a depth of ¼ and ½ in. (Curves 1 and 2 of figure) would be "quick-frozen." Meat at depths greater than ½ in. would not come within this classification. If the location and size of the ice crystals are the criteria, and if intra-fiber ice crystals are taken as a measure of "quick-freezing," then beef at a depth of ¼ in. from the surface may be considered to be "quick-frozen" (Fig. 2). Successively larger extra-fiber ice crystals, indicative of slow freezing, were observed at ½, 1, 2, and 4 in. from the surface. The size of the ice crystals at a depth of 4 in. in the beef round is shown in Fig. 3.

The slowest freezing rate occurs when the meats are frozen at a temperature just below their freezing point. After several weeks at 28 deg. F., ice crystals ½ in. long and ⅛ in. thick have been observed in beef. At the other extreme, beef steaks ½ in. in thickness were frozen within a few minutes in liquid nitrogen at a temperature of —320 deg. F. Fig. 4 shows many extremely small intra-fiber ice crystals, of about 1 to 2 microns in size, that are formed when beef is flash-frozen in liquid nitrogen.

Color is another characteristic of beef that is affected by the rate of freezing. Slow-frozen meats are dark — therefore unattractive in appearance. The rate of freezing should be fast enough to keep the color of the lean meat at least as light as it was before freezing. This result is particularly important if the meat is being merchandised in the frozen state.

The effect of rate of freezing on color is illustrated in Fig. 1, which shows eight steaks—two not frozen, two frozen at —20 deg. F. in an air blast of 1,500 ft. per min., two frozen by indirect contact with dry ice at—110 deg. F., and two frozen slowly at 20 deg. F. Those frozen at —20 deg. F. approached the fresh steaks in color, whereas those quick-frozen at —110 deg. F. were much lighter in color, and those slow-frozen at 20 deg. much darker. These differences were caused by differences in the size and location of the ice crystals. When the steaks were thawed, the color differences apparent in the frozen condition disappeared.

Meat Characteristics and Freezing Rate

Experiments were made to determine the influence of kind of meat, age of meat, amount of fat, and grinding on the freezing rate. Samples of beef, pork, lamb, and veal, 2 x 2¼ x 4 in. in size and weighing 300g., were used. Some of the samples were very lean, others were lean interspersed or marbled with fat, and still others were solid fat tissue. A thermocouple was inserted in the center of each cut before samples were placed on wooden bars and frozen at —10 deg. F. in air with natural movement.

The data obtained in six different tests are summarized in Table I. Time is recorded for each 10 deg. F. drop in temperature from 40 deg. F. down to 0 deg. F. The most significant change is between 30 deg. F. and 20 deg. F. Amount of fat in the meat influenced the time required for the temperature to fall those 10 deg. in that the freezing rate was accelerated with increase in the fat content.

This faster rate of freezing for fat beef may be explained by differences in the amounts of moisture and by the heat characteristics of water and fat. Fat tissue used in this test contained 15.5 percent moisture, as compared to 75.5 percent moisture in lean beef. The specific heat of fat is less than that of water and the latent heat of fat tissue is dissipated by fat crystallization at temperatures above 32 deg. F.,

while most of the latent heat of lean tissue is extracted in the temperature range of 30 to 20 deg. F. Moran[13] has shown that 88.7 percent of the water in beef is frozen at 19.4 deg. F. Thus, the greater amount of moisture and the consequent higher heat capacity of lean meat accounts for its slower rate of freezing.

The data in Table I indicate that beef, pork, lamb, and veal all freeze at similar rates if the fat contents of the meats are similar. Although the meat juices and meat proteins are more closely bound in aged meat than in fresh meat, it is of interest to note that aged meat froze just as quickly as fresh meat. Grinding the meat did not appear to affect the freezing rate significantly.

Tests were made to determine the effect of the thickness of cuts of meat on the freezing rate. Beef was ground through a ⅝ in. plate and molded into blocks of equal weight and equal fat content but differing in thickness. A thermocouple was located in the center of each cut and the cuts were placed on wooden bars to be frozen at —10 deg. F. in air with natural movement.

It will be observed in Table II that as the thickness of the ground meat was reduced from 2 in. to 1 in. to ½ in., the time required for the temperature to drop from 30 to 20 deg. F. was reduced from 3.1 to 2.6 to 1.2 hr., respectively. Obtained, as stated, on meat of uniform fat content, these data check with the results of Nicholas and associates[14], showing the importance of reducing the thickness of the meat to a practical minimum as a means of accelerating the rate of freezing.

External Factors

At any freezing temperature, there are factors that affect the rate of freezing of meat. It is increased by: (1) Using methods which accelerate the transfer of heat, and (2) using packaging materials that have little insulating value. Commercially, most meats are frozen either in air with natural movement of less than 50 ft. per min., or in an air blast, velocity of which may range up to 1,500 ft. per min. or more.

It is of interest to know how much the rate of freezing is accelerated by increasing the air velocity. Experiments were made wherein blocks of twelve 1-lb. units of ground beef, containing 25 percent fat, were frozen at an ambient air temperature of —16 deg. F. and in air velocities of: (1) Less than 50 ft. per min. (natural air movement), (2) 200 ft. per min. (3) 500 ft. per min., and (4) 1,500 ft. per min. Air movement measurements were made close to the product.

Three lots of ground beef were tested in duplicate using different packaging procedures: (1) Twelve unwrapped 1-lb. units of ground beef stacked in a block 5.75 x 8.00 x 8.25 in. in size; (2) twelve moistureproof cellophane-wrapped 1-lb. units with cotton stockinette overwraps stacked in a black 5.85 x 8.25 x 8.50 in. in size; and (3) twelve moisture-proof cellophane-wrapped 1-lb. units with cotton stockinette overwraps packed in a double corrugated shipping container 6.10 x 8.50 x 8.73 in. in size. A thermocouple was inserted in a unit of the ground beef at the approximate center of the 12-lb. stack.

In another series of tests, single 1-lb. units of beef were used rather than the blocks of 12. But the procedures followed were similar with thermocouples located in the center of units of ground beef 2.0 x 2.75 x 5.75-in. in size. Freezing data were obtained for unwrapped units, for moisture-proof cellophane-wrapped units, and for units wrapped in cellophane and then packaged in 18-point waxed cardboard cartons.

Data on rate of freezing as influenced by air velocity are reported in Table III. These show that the freezing rate of ground beef is markedly accelerated by increasing air velocity from natural air movement up to 200 ft. per min. Considerable acceleration is also shown by increasing air velocity from 200 ft. to 500 ft. per min.

However, there appears to be little gained in freezing time by increasing air velocity from 500 ft. to 1,500 ft. per min.

These results confirm and extend those reported by Nicholas *et al*[14] and

(*Turn to page* 219)

These Freezing Factors Make All the Difference

TABLE I—Effect of Some Characteristics of Meat on Freezing Rate

Identification of Meats (Sample size—2"x2.25"x4") (weight 300 grams)	No. of Samples	Age (days)	Fat (%)	Moisture (%)	Average Freezing Time in Hours (Ambient Temperature — 10 Deg. F.)† 40°F to 30°F	30°F to 20°F	20°F to 0°F.	Total Time
Beef — fat tissue	6	4	80.6	15.5	0.5	1.0	1.7	3.2
Beef — lean, well marbled	6	4	14.4	65.4	0.5	3.0	1.2	4.7
Beef — lean, well marbled	6	14	14.4	65.4	0.6	3.0	1.2	4.8
Pork — lean, well marbled	6	4	6.7	69.7	0.5	3.0	1.2	4.7
Lamb — lean, well marbled	6	4	6.1	70.5	0.6	3.1	1.2	4.9
Beef — lean, not marbled	6	4	1.9	75.4	0.6	3.5	1.2	5.3
Veal — lean, not marbled	6	4	1.7	75.6	0.7	3.5	1.1	5.3
Beef — lean, plus fat (ground)	2	4	5.0	——	0.4	3.1	1.5	5.0
Beef — lean, plus fat (ground)	2	4	25.0	——	0.5	3.1	1.2	4.8
Beef — lean, plus fat (ground)	2	4	50.0	——	0.4	2.5	1.6	4.5

† Atmospheric temperature in the freezer.

TABLE II—Relationship of Thickness of Meat Cuts to Freezing Rate

Number of Samples of Ground Beef	Characteristics of Samples: size (inches)	Weight (grams)	Fat Content (%)	Average Freezing Time in Hours (Ambient Temperature — 10 Deg. F.)† 40° to 30°F	30° to 20°F	20° to 0°F	Total time
(2)	2x2.25x4	300	25	0.5	3.1	1.2	4.8
(2)	1x4.50x4	300	25	0.4	2.6	1.0	4.0
(2)	0.5x9.00x4	300	25	0.4	1.2	0.7	2.3

† Atmospheric temperature in the freezer

TABLE III—Effect of Packaging and Air Velocity on Freezing Rate of Ground Beef.

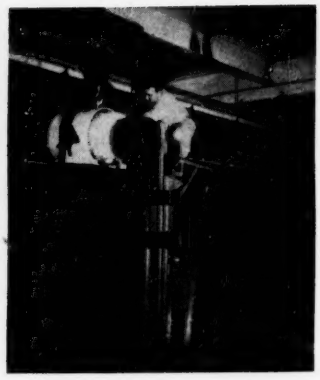
Identification of Package	Air Velocity over package (feet per minute)	Number of Tests	In Blocks of 12 — 1 lb. Units: Average Freezing Time in Hours (Ambient Temperature — 16 Deg. F.) 36°F to 31°F.	31°F to 25°F.	25°F to 0°F.	Total Time	In 1 lb. Units: Average Freezing Time in Hours (Ambient Temperature — 16 Deg. F.)† 36°F. to 31°F.	31°F. to 25°F.	25°F. to 0°F.	Total Time
Not packaged	50	2	2.7	8.5	3.5	14.7	1.0	2.7	1.0	4.7
Cellophane	50	2	3.0	14.2	5.0	22.2	1.0	3.7	1.7	6.4
Cellophane and Carton	50	2	3.5	24.5	8.5	36.5	1.2	5.0	2.5	8.7
Not packaged	200	2	1.5	5.5	3.0	10.0	0.5	1.5	0.5	2.5
Cellophane	200	2	1.5	11.2	3.5	16.2	0.7	2.7	1.0	4.4
Cellophane and Carton	200	2	3.5	22.5	5.5	31.5	0.7	3.8	1.7	6.2
Not packaged	500	2	0.5	2.7	1.7	4.9	0.5	1.0	0.4	1.9
Cellophane	500	2	1.5	4.0	2.2	7.7	0.7	1.4	0.5	2.4
Cellophane and Carton	500	2	3.5	16.5	4.0	24.0	0.5	2.8	1.2	4.5
Not packaged	1500	2	0.5	2.7	1.5	4.7	0.5	1.0	0.4	1.9
Cellophane	1500	2	1.0	4.2	1.2	6.4	0.5	1.4	0.5	2.4
Cellophane and Carton	1500	2	3.5	15.7	3.5	22.7	0.5	3.0	1.0	4.5

Units of ground beef 2 x 2.75 x 5.75 in. in size and containing 25 percent fat. The twelve units were packaged in a block 5.75 x 8 x 8.25 in. in size.
† Atmospheric temperature in the freezer.

Readily Moves Power Unit

Boom is attached . . .

then motor is hooked on . . .



and lifted for transfer

Use Your Lift Truck for *Maintenance*

This handy unit can be employed "as is" for numerous special tasks. What's more, addition of some simply-made attachments will double its value

W. A. REED
Plant Engineer,
Taylor Reed Co., Glennbrook, Conn.

Versatility of the fork lift truck is worth the special consideration of every enterprising food processor.

The importance of this unit for rapid and economical handling of raw products and finished goods is, of course, well known to most operators. Its advantages in warehousing are recognized.

But that's not the whole story. Its value doesn't stop there. For it can also perform as a first-rate maintenance tool—as a crane or hoist, a mobile anchor, a ladder, or a temporary scaffold. In short, it can be the "army mule" of the food plant.

How the fork lift truck can be made a vital component of the maintenance department is exemplified by the practice at Taylor Reed Co., in Glennbrook, Conn. Here, the handy lift truck has been put to work doing all sorts of tough jobs better. And by development of special attachments—easily made—its capacities have been multiplied.

This company's new technics with the lift trucks are spotlighted in the following discussions of plant maintenance problems and lift truck solutions.

When machines weighing several tons are brought into or relocated in a plant the maintenance crew is not always equipped to handle the situation. Riggers can be called in, but this runs into considerable expense. The maintenance crew can inch the machine along its travel and into place with jacks and pinch bars. This method is usually harmful to the plant floors.

When a floor support or column can be used as an anchor, a block and tackle or chain hoist may skid the machine along a part of its journey. However, such anchors are seldom in the path of travel.

This is where the fork truck comes in. It can almost always provide the necessary anchor, and be spotted as needed, throughout the machine's travel to its final location.

Though the loaded fork truck weighs several tons, its motive power should not be used for skidding a heavy machine. For the tires suffer even if the traction is sufficient. The truck's value is in its use as a mobile anchor. In this capacity, it can be alternately located and relocated in the direction the machine must travel, and at any point along its route.

This is the procedure: One end of a chain hoist, preferably the type operated by lever bar and ratchet, is attached to the skid under the machine. The other end of the hoist is hooked to the lowest, near end, member of the fork truck. The truck is then moved (in the path the machine is to travel) the length of the hoist chain from the machine. At this location, chucks are placed under the truck wheels and the machine drawn to the truck by operating the chain hoist.

A loaded fork truck can be used without damage, as an anchor, to move several tons of machinery on skids. Floor supports or columns might be damaged if used as such.

Detachable Boom Used

Many food plants use the fork truck for transporting equipment within the truck's lift range. The forks are used as a platform for the equipment. Helpful as this operation is, it has disadvantages. The equipment must be loaded on a pallet, or raised to permit the forks to slide under it, and it is unloaded the same way.

However, a detachable boom will make it possible to pick up, transport, and place the equipment without intermediate steps.

A satisfactory boom is not hard to make. It can be welded from scrap. The frame is made of heavy 4-in. pipe or boiler tube. The upright, 7 to 8 ft. long should be reinforced by welding strips of 1 x 1-in. strap along the full length of the pipe above the crossbar. A 4-ft. length of tube is welded at

right angles. And a ½ or ¾ in. reinforcement plate is welded in the angle extending 1½ ft. along each member. Three loops made of iron rod are welded 1 ft. apart to the boom. These are looped far enough below the boom to allow a chain hoist to be hooked through them.

Two bars of ¾ or 1 in. steel, the same length and width as the crossbars on the truck lift, are welded to the boom upright on the side opposite the horizontal boom member. They are spaced the same distance apart as the crossbars on the lift. Holes are drilled in the bars to match those in the lift for bolting when the boom is in place. A lip of angle iron is welded to the upper boom crossbar. This lip fits over the upper lift crossbar between the lift uprights.

When the boom is to be used, the forks are first removed. Then the lip on the upper boom crossbar is slipped over the upper lift crossbar, where it rests holding the boom in place. Bolts, fastening boom and lift crossbars together, are then tightened.

Make It Safe

The boom can be elevated the distance of the fork's travel. This makes it possible to elevate the top of the boom about 20 ft.—high enough above the floor to handle the positioning of heavy motors or other equipment. Placing and bolting or welding equipment into position at an elevation which requires ladders or scaffolding for the workmen introduces an accident hazard.

This can be overcome in part by a 3-ft. metal platform welded to the rear face of the lift frame about 1 ft. above the truck operator's head. The platform frame is made of angle iron and the surface is of expanded metal.

This arrangement serves not only as a work station for locating equipment, but also as a safety device, for it provides head protection for driver.

At times, a fork truck can be used to provide a temporary elevated work platform or a traveling ladder. In these operations, workmen will have repeated occasion to ride the lift up and down. Unless special provisions are made, an off-balance rider may try to steady himself by grabbing whatever is most convenient. And if he takes hold of the lifting chains the result may be mangled fingers.

Safety grips should be welded on the outside of the lift uprights, one on each side, and one on the upper side of the top horizontal lift member. Then the lift truck operators and riders are to be instructed that the lift must never be operated with a man on the pallet platform unless both hands of the rider holding the safety grips can be seen by the operator.

As the platform ascends, the side grips pass out of reach of the rider. The third grip, across the top of the lift frame, becomes accessible while the side grips are still in use. For safety, the operator should halt the ascent to give the rider time to transfer his grip. The top grip is accessible at all but the most elevated positions.

When two trucks are available, one with an auxiliary boom can lower heavy equipment into place at an elevation, while the other, using fork and pallet, provides a work platform at the right height and location.

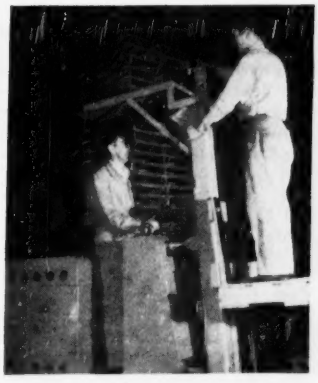
When safety platforms are constructed on the lifts above the heads of the operators, the forks on the truck providing the platform do not have to be raised and lowered to permit workmen to ascend and descend. For the safety platform provides a ladder of three steps from truck to pallet platform.

Eases Heavy Equipment Into Place

Here truck acts as mobile anchor in hauling big machine

Makes Light-Fixture Work Fast and Safe

Special hand grips on side . . .



and top . . .

speed job, reduce mishaps

When Freezing Apple Slices Be Sure of Your Variety

—because quality of final product will depend on your choice of fruit . . . authors tested several kinds, tell which stood freezing best, and why

KATHERINE G. KNIGHT and PAULINE C. PAUL

Dept. of Food & Nutrition, Michigan State College, East Lansing, Mich.

Since all varieties of apples do not respond to freezing in the same way, it is important for a processor to know which kinds are best suited for preservation by this method. Also, he should know the best pre-freezing treatments to insure fresh color and crispness.

To supply this information, a study was made of five of the most important apple varieties grown in the state of Michigan.† Of these varieties, excellent freezing qualities are possessed by Rhode Island Greening and Jonathan apples. Furthermore, they were even more acceptable when treated with ascorbic acid prior to freezing.

Varieties tested were McIntosh, Rhode Island Greening, Jonathan and Northern Spy.* The apples were run-of-the-orchard. And they remained in storage for approximately one month before they were prepared for freezing.

Apples were peeled and cored on a mechanical unit, dropped into a 1 percent salt solution to prevent browning between peeling and subsequent handling, then trimmed and sliced into twelfths.

Control samples were frozen without further treatment. Other samples were treated with: (1) An 0.08 percent solution of l-ascorbic acid under vacuum; (2) a combination of 0.08 percent ascorbic acid and 0.1 percent calcium chloride under vacuum; (3) a 0.1 percent solution of sodium metabisulphite (as source of SO_2); and (4) the sodium metabisulphite solution after soaking in 0.5 percent $CaCl_2$ for 30 min.

The sodium metabisulphite treatment consisted of immersing the fruit in the solution for 2 min., then draining followed by storage in a covered container for 3-hr. to permit penetration of the SO_2.

After the apples were treated, enough slices for one 9-in. pie were packed into waxed 1-qt. paperboard tubs with slip-in lids. Four parts of fruit were packed with one part sugar, taking care to get a complete mixture. The fruit was frozen at –40 deg. F. and held at 0 ± 2 deg. until used.

The tests were made on the apples before they were prepared for freezing and after they had been in zero storage 2, 4, and 6 months. Samples were baked into pies and scored subjectively for color, consistency, odor, flavor, tenderness and texture of fruit, texture of crust, general conclusions, and acceptability. Color was measured by a spinning disk colorimeter using the Munsell system. Raw fruit was used for analyses for ascorbic acid and SO_2.

Rhode Island Greenings received the highest average general conclusion score for all treatments of the entire test period. Jonathans were second, McIntosh third, and Northern Spy fourth. The Jonathan apples were acceptable a greater number of times than any other varieties. They received the highest score during the entire test period for plain frozen apples. Northern Spy and McIntosh were poorest.

Rhode Island Greenings had the highest score for fruit treated with ascorbic acid, Jonathans were a close second, and McIntosh received the lowest score. Ascorbic acid with $CaCl_2$ produced about the same results with Jonathans, Rhode Island Greenings and Northern Spies, and again the McIntosh variety was lowest.

McIntosh apples gave better results with SO_2 than with any other treatment. For this treatment, Jonathans and McIntosh apples had the highest scores. Rhode Island Greenings received the highest score for fruit treated with the combination SO_2 and $CaCl_2$ treatment. Here, McIntosh was second, Northern Spy third, and Jonathan fourth. The Jonathan variety kept best in zero storage and the McIntosh the poorest.

Fruit treated with ascorbic acid received the highest scores for flavor and general conclusion. Order of desirability for the other treatments was sodium metabisulphite, ascorbic acid and $CaCl_2$, sodium metabisulphite and $CaCl_2$, and the control. Addition of $CaCl_2$ lowered the scores of all samples.

The Jonathan was the only variety that remained acceptable without any treatment. Samples that were treated to prevent browning were acceptable most of the time. Addition of $CaCl_2$ to the SO_2 treatment reduced acceptability of these samples more than the addition of it to the ascorbic acid.

Color Changes Slight

Color measurements indicated that the hue, value, and chroma changed very little between the test periods. The Jonathan variety had the lightest and brightest color, the McIntosh was second.

The control sample of McIntosh variety had the lowest average notation for hue, indicating that it had the greatest amount of red. Rhode Island Greening samples treated with ascorbic acid were the most yellow, and Jonathans changed in color less in storage than any other variety. Samples frozen without any treatment were darker than those that were treated.

Effect of Ascorbic Acid

Ascorbic acid appeared to be stable in the samples treated with it alone. Samples treated with ascorbic acid and $CaCl_2$ lost ascorbic acid in storage. However, these samples took up more ascorbic acid in the beginning than those treated with this vitamin alone.

SO_2 was well retained in the samples during zero storage. Northern Spy apples did not take up as much SO_2 as did the other varieties and gave a darker product because of this.

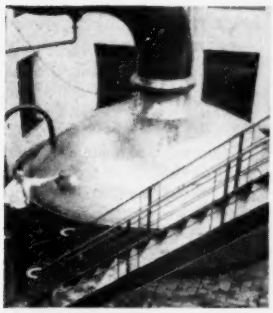
From observations made in this study it appears that: (1) Rhode Island Greenings rated first and Jonathans rated second of the varieties tested; (2) apples must be mature at time of harvest to make a satisfactory frozen product; (3) ascorbic acid was best for prevention of browning in Rhode Island Greening, Jonathan and Northern Spy apples. Sodium metabisulphite (SO_2) was best for the McIntosh variety, and (4) calcium chloride, in the proportions used, did not improve the quality of the apples.

The above feature is based on the paper "The Freezing Qualities of Five Varieties of Michigan Apples." which was authorized for publication as Journal Article 1056 (N.S.) of the Michigan Agricultural Experiment Station. Funds were provided by Rackham Research Endowment.

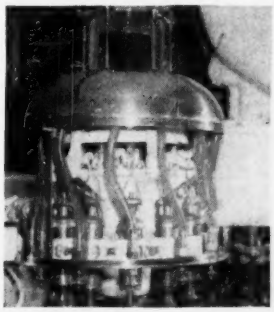
† Apples were harvested in the fall of 1947.

* Baldwin variety apples were also studied, but due to an early frost they were immature when picked. For this reason the results are not included in this report. The other varieties were firm and well-colored.

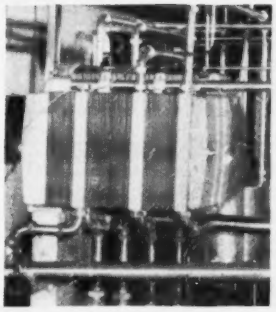
A SPECIAL FOOD INDUSTRIES REPORT



Copper Kettle

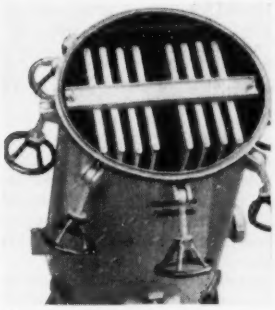


Plastic Tubing



Stainless Steel Pasteurizer

Glass-Lined Steel Kettle



Monel Filter Screens

Aluminum Churn

MODERN MATERIALS

Solve Food Processing Equipment Problems

Resistance to corrosion, protection against product contamination, and improved sanitation can be built into equipment through selection of proper materials. This report discusses the properties of different materials and illustrates the best for the purpose on process flowsheets

JAMES A. LEE
Southwestern Editor, Chemical Engineering

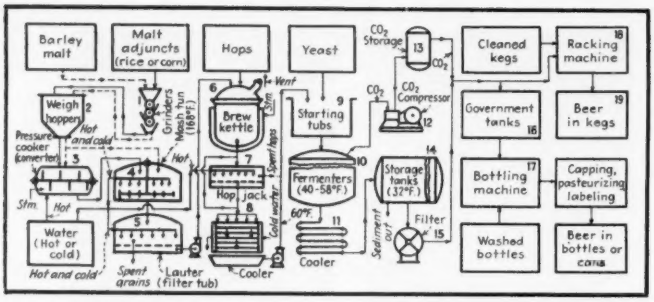
The information presented in this report has been made available through courtesy of the McGraw-Hill Book Co. It is from the forthcoming book, "Materials of Construction For Chemical Process Industries," by James A. Lee, Southwestern Editor, Chemical Engineering. The book will be published this fall as a separate volume and as part of the 5-volume McGraw-Hill Chemical Plant Library—The Editors.

The last fast-moving 15 years have seen many forward strides in the development of improved materials for fabricating food processing equipment.

Notably, the new materials are "doing the job better"—offering advantages of increased durability, permanence, advanced sanitation, and greater resistance to corrosion.

The new progress has been more than a matter of formulation of the materials. Painstaking experience has made a major contribution. For instance, the stainless steels have gone through a period of transition in which formulas have been modified and some few have been dropped from the catalogs. Also, nickel and aluminum, and their alloys, have found many new uses in the food field. And glass tubing is gaining importance in wineries, dairies, and fruit and vegetable processing plants.

Such changes and new knowledge are reflected in the advanced design and construction of equipment, and in the operational technics of the newer food plants.



"BREWERIES use copper wherever heat is added or removed." Materials used: (1) steel, (2) steel, (3) copper, stainless steel, (4) copper, stainless steel, (5) steel, copper, stainless steel, (6) copper, stainless steel, aluminum, (7) copper, steel, (8) copper, stainless steel, (9) steel or wood lined with pitch-type coatings, (10) glass-lined steel, wood with pitch coating, or aluminum, (11) stainless steel or copper, (12) steel, (13) steel, (14) glass-lined steel, wood lined with pitch coating, or concrete coated with mastic, (15) copper, steel or stainless steel, (16) glass-lined steel, (17) stainless steel or bronze, (18) stainless steel or brass, (19) stainless steel, aluminum, or pitch-lined wood. Pumps: bronze or stainless steel. Pipes: copper.

This present report covers use of the new materials in units employed to process the following important food products: Apple products, applesauce, beer, fruit juices, gelatin, grape juice, meat, milk and milk products, nut pastes, oleomargarine, oysters, peanut butter, peppermint oil, pickles, salad dressing, tomato products, syrups, cane sugar, vanilla extract, vegetables, vinegar, and wines.

There also are accompanying flow-sheets based on operations in the most modern plants. In these diagrams, each item of equipment is numbered and the materials used in their construction are identified in the captions. The text itself elaborates on the various processes relative to the materials, and alternate production methods are also discussed.

In numerous instances, success in one branch of the food industry has led to a profitable adoption of ideas in another. For this reason it is believed that the reader—no matter what product he processes—will derive benefit from a perusal of the whole report.

For convenience as a reference, discussions of the various processes have been arranged alphabetically according to the representative food classification. Thus, the reader may readily check back to focus his attention on those material practices most pertinent to his own branch of the industry.

APPLESAUCE

During its preparation, applesauce is very susceptible to darkening by oxidation. Also, it should be remembered that this product is highly vulnerable to metallic contamination. In manufacture, contact with iron and copper should be avoided as far as possible. For this reason, glass-lined steel, in combination with 18-8 stainless-steel fittings, is an ideal acid-resisting material for use in making this sauce.[1]

Choice of the material of construction for the finishing screen is of great importance. The most acceptable metals for this purpose are nickel and 18-8 stainless steel. Texture of the applesauce is governed by the diameter of perforations used for the finisher screen.

Monel is used in some plants for construction of trough-type and rotary cylindrical cookers. Cooker agitators are equipped with Monel paddles and Monel-covered shaft.

How It's Made

Apples from storage move along inspection belt conveyors, where undesirable fruit is removed.[2] Weighing and blending is done with whole, unpared fruit. The apples then pass along to the paring and coring machines. Afterward they pass through a spray of water.

While apples are being fed to the glass-lined steel digester-cooker unit, a blanket of steam at low temperature is kept over the pared fruit to prevent discoloration through oxidation. Steaming or cooking is accomplished by means of injectors that feed live steam to the whole apples.

Only one moving part is used in the cooker—that is, the combination impeller-propeller agitator of stainless steel, which has no effect upon the color or flavor of the final product.

Disintegrated cooked apples are fed, via direct connection, to a paddle-type finisher of nickel or 18-8 stainless steel. The finished sauce is then put into cans.

APPLE PRODUCTS

The preparation and packing of apples and apple products require considerable processing equipment, some of which must withstand severe chemical action.

Stainless steel is used for such equipment as deaerators for removal of occluded oxygen from apple pieces. Wood, too, is used in some places—the conventional blanching of apples, for either canning or freezing, is carried out in a wooden tank.

In other plants, apple washers in which 2 percent hydrochloric acid is used are made of Monel. And woven-wire belts of the same material are used to convey apples through blanchers. Tanks and heating coils of this metal are used in evaporation of apple juice. Monel-lined buggies and piping convey juice from presses.

In one modern plant, the following process is used for packing apples and apple products: Fruit is washed, graded, peeled, and inspected, then sliced, and the slices immersed in 1 percent salt brine. They are next screened and dumped onto a series of inspection belts.

If the apple pieces are subjected to a vacuum and a liquid is injected into the evacuated chamber containing the deaerated pieces, the occluded air is replaced by the liquid. For the process to be successful, temperature and chemical characteristics of the liquid must be controlled. To do this deaeration job, special units of stainless steel were developed.

The conventional blanching is carried out in a wooden tank filled with water and kept at a temperature close to boiling. However, this plant has developed its own blanching technic, a continuous steam blancher. After the apple pieces have been blanched, they are ready for either canning or freezing.

BEER

Special problems are present in the brewing industry in the selection of materials for equipment construction. At certain stages in production, beer may be actively corrosive. At all times great care must be taken to avoid turbidity or cloudiness and to secure and maintain proper flavor.

Breweries make considerable use of copper. High heat conductivity of this metal and the fact that it is not corroded by beer, wort or water are the main reasons, but ease of cleaning, ease of fabrication, and long-life are also important. Copper is used whenever heat is being added or removed, and where liquids are in motion. It is used

for brew kettles, mash tubs, coolers, filters, pipe lines, fermenting kettles, and equipment for yeast culture. Much of the interconnecting pipe is also made of copper, including coils for cooling the wort. In some cases, vessels are merely lined with copper or have false bottoms made of either copper or bronze for straining purposes. Bare copper has been found to be much better than tinned copper.

Nickel-clad steel is used in some breweries for fermenters, combination mash and lauter tubs, cereal cookers, and hop separators. Brewing kettles can be nickel-clad steel with a solid-nickel dome and vapor line. There is also, at times, a nickel dome and vapor line on the copper kettle. The grout collecting trough, and piping are sometimes nickel.

Monel is used in some plants for attemperator coils, CO_2 collecting tanks, bottling lines and beer filters. Mashers may be Monel lined with Monel tubes or solid nickel. Yeast storage tanks may be made of solid Inconel.

Fermenting and Storage Tanks

For over 60 yr. the industry has made use of glass-lined equipment for fermentation and storage. In some breweries, after fermentation and removal of yeast, the beer is passed through heat exchanger coils and sent on to the glass-lined storage tanks.

Stainless steel has widened the choice of materials available for brewery equipment. Actual installations in use over some years have established the fact that 18-8 stainless steel is neutral to wort, fermenting beer, and stored beer.

Aluminum and its alloys are suitable for the fabrication of equipment used in handling and processing. Its lightness and freedom from corrosion make it satisfactory for yeast equipment, wort coolers, brew kettles, storage tanks, fermenters, filters, steam coils, pasteurizing equipment, and such miscellaneous items as shovels, dippers, buckets, and skimmers. At the end of the fermentation, yeast is skimmed from the surface of the fermenting wort and removed in aluminum tubs. This yeast is used to start succeeding batches of wort fermenting and to supply the yeast plant.

Brewer's hose is white with a sanitary cover. It is easily cleaned and is especially developed so as not to impart taste, taint, or odor to the brew. Such rubber pipe lines and hose are used for transferring beer from one vessel to another.

A phenolic resin is used for lining beer storage tanks, fermenters, filter tanks, hot wort tanks, mash and lauter tubs, pipe lines, rackers, valves and bottle-filling equipment. The smooth resin film minimizes beer-stone accumulations on the walls of storage tanks and fermenters.

FRUIT JUICES

Processing of fruits presents a special problem because the acids contained in fruit juices are exceedingly corrosive to most metals. Furthermore, there is corrosion from the preservatives used for these juices. The principal preservative is sulphur dioxide. It is added, not only to prevent fermentation, but also to prevent deterioration of color by oxidation. Furthermore, certain of the equipment must stand the action of cleaning compounds containing alkalis and acids.

Fruit processors have found that stainless steel is resistant to corrosion from acids contained in fruit, and the metal, in turn, does not impair the original flavor, color, or vitamin content of the fruit. Stainless steel equipment used in fruit juice extraction and canning includes sorting and preparation tables, mixing tanks, extractors, and can fillers. This metal is used also for concentrators, conveyors, cookers, dippers, fruit knives, heaters, sinks, vacuum pans, vats, and tubing and pipe lines.

While 18-8 stainless steels are resistant to pure fruit juices, it is necessary to use the molybdenum-bearing types when the juices contain SO_2 preservative[2].

All equipment used in the juice plant of Texsun Citrus Exchange, at Weslaco, Tex., is stainless steel or aluminum, since vitamin C is catalytically oxidized by the presence of traces of iron or copper[3].

The action of acid fruit juices on aluminum is less predictable than is that of pure acids present in these products. It is an interesting fact that the total acidity or pH of a fruit juice is no criterion of its behavior toward aluminum—addition of sugar, for example, reduces the attack. It also has been observed that, if fruit juices contact no other metals prior to coming into contact with aluminum, there is no risk of any serious attack on the aluminum. However, if the fruit acids pick up small amounts of heavy metal compounds prior to the time they come in contact with aluminum, they are likely to be quite corrosive[4].

According to Gilroy and Champion[5], corrosion from apple juice is very slight with no pitting. With the other juices tested by these investigators, the SO_2 preservative can cause serious attack in natural or concentrated juices, but not in synthetic solutions. Corrosion by citrus fruit juices was not related to the concentration of the juice and was only partly due to the citric acid content.

The following practical conclusions are drawn from the results of these investigations: (1) For natural and concentrated apple juice under CO_2 at pressures up to 120 psi,; 99.8 percent pure aluminum is preferred over aluminum alloys; (2) for black-currant juice 99.8 percent pure aluminum is preferable to the alloys (the 99.8 percent aluminum is satisfactory except perhaps for its effect on the color of the juice); and (3) for lemon juice containing 0 to 350 ppm. SO_2, and for other juices containing 0 to 700 ppm., 99.8 percent pure aluminum is preferred.

Copper and Alloys for Peaches

Copper and its alloys are widely used in the handling and processing of fruits. In canning peaches and apricots, many items of equipment made from copper or its alloys are used. Automatic pitters and slicers have brass and bronze castings. After lye peeling, peaches are handled by an elevator having copper flights and side walls. Parts of the blanchers coming into contact with the fruit are made of copper. Copper screens are used in the grader that sorts the various sizes of fruit before it drops into copper chutes that convey it to packing tables and cans[6].

Many parts, such as intermediate tanks, piping, and skimmers, are made of copper, and fruit pulping machines have all parts coming into contact with the fruit juice made of copper, brass or bronze. Pumps are usually made of bronze. Brass is used for slicing wheels[7].

Monel, nickel and Inconel can be used successfully with dilute solutions of sulphurous acid, such as are used in preservation of fruits. Inconel is superior to the others from the standpoint of tarnish resistance.

In passing through the washing solutions, grids of the machine must withstand corrosive action of soda ash, sodium silicate, hydrochloric acid, light mineral oils and wetting agents. The rate of corrosion is speeded up by heat and by thorough aeration occuring during the first washing operation.

After trying out metals without success, an engineer found that a successful machine can be built by using a grid made of rods of cold-rolled steel covered with Neoprene. The rods are mounted between blocks of maple cut and curved to fit the covered rods, and held together by a tie rod of Monel. These tie rods extend through the wooden sides of the grid and so are entirely covered and protected from corrosion.

For fruit flavoring, concentrates are often processed in glass-lined steel distillation units. Also a glass-lined continuous deaerator is in use.

Glass piping is used to handle orange and lemon juice in concentrat-

ing plants. Laminated phenolic bearings are preferred to bronze because of increased resistance to the fruit juices.

GELATIN

Because of the need for great cleanliness and purity of gelatin intended for consumption purposes, special materials of construction are used in the equipment for its manufacture. On the other hand, gelatin for inedible purposes does not call for particular purity and consequently can be produced in ordinary materials.

Aluminum equipment is extensively used for making edible gelatin. It is used for evaporators, storage tanks, cooking tanks, piping, dryer trays, and chutes from grinders to screens. Aluminum is one of the few metals from which equipment for the preparation of edible gelatin can be made.

Nickel, Monel, and Inconel, too, are used for edible gelatin. In one plant, all equipment coming into contact with the gelatin is made of nickel or its alloys. Evaporators, drying nets, heating coils, kettles, and storage tanks are Monel or Nickel. Inconel is useful for drying nets.

Edible-gelatin solutions, in course of refinement, are sometimes handled in glass-lined equipment, which resists the mineral acid present, thus eliminating dissolved metals as an impurity in the final product.

Copper is used for concentrators, pipes, storage vessels, and mixing pans.

Wood, too, is used in the production of gelatin. It is employed for tanks in which crushed bones are treated with hydrochloric acid to separate the collagen from calcium phosphate and other mineral matter. It is also used in extraction tanks employed later in the process.

Concrete vats are used in making gelatin from bones and hides.

GRAPE JUICE

In making grape juice, it is essential to use materials of construction that will not affect the color or flavor of the juice, just as it is in the case of the closely related wine industry. The 18-8 stainless steel and glass-lined steel are used for many of the important pieces of equipment, since they are immune to the acids encountered.

In one modern plant, incoming grapes are dumped into a washer-conveyor, which takes them to a stemming machine. Stems go out one chute, grapes go into a stainless steel steam-jacketed cooking kettle equipped with stainless steel agitators. Here, the product is raised to 140 deg. F. Then it is transferred to a hydraulic press.

Frames containing the trays of grapes are mounted on trucks running in front of and behind each press. In front of each press truck station is a stainless steel funnel. Funnels are connected by pipe to receiving kettles under the presses. There are two stainless steel and one glass-lined kettle. Juice is pumped to stainless steel jacketed kettles. These act as balance tanks, and also maintain the temperature of pressed juice at 120 deg. F. prior to actual pasteurization. From these kettles, the juice flows by gravity through a continuous pasteurizer which supplies the filling machines. Some juice is only flash pasteurized and then cooled and pumped through aluminum pipe line to a refrigerating plant.

MEAT

Demands for strict cleanliness of plants for processing beef, hogs, and other cattle, from killing rooms to sales coolers, have brought about high sanitation. To obtain such cleanliness, packers have resorted to stainless steels and other modern materials of construction.

For many years stainless steel has served meat packers and retailers alike in numerous applications where absence of corrosion, ease of cleaning, and durable service are important. Stainless ham molds were among the first applications and were forerunners of the table tops and meat hooks, tubing and mixers, viscera-inspection tables, conveyors, and trucks of stainless steel in today's modern meat industry.

In the killing rooms, use is made of stainless-steel hooks. Head-inspection stands and flushing booths, head-trimming tables, trucks, trays and containers for edible parts, washing and shrouding equipment are of stainless steel.

In the chill rooms, stainless-steel casing washers, belly rollers, and pork-cutting tables are used. Meat-cooler cases have recently been constructed with complete inside and outside containers of 18-8 stainless-steel sheets.

Stainless-steel grinders, also stuffing horns, and tables are often used in manufacturing pork sausage and other sausage specialties. Smokehouse linings and smokehouse conveyor rails of stainless give satisfactory service. Stainless ham and veal pans, when made of sufficiently heavy gage, contribute to long service life under severe conditions.

In the beef- and pork-dressing departments, stainless is used for viscera conveyors and viscera-inspection tables. Chutes, troughs, tanks, and vats used in beef, pork, and lamb dressing are fabricated of stainless steel. Meat trucks in many departments are made of this metal.

Sale cooler rooms in packers' plants and branch houses use racks, tables, and meat hooks of stainless for sanitary requirements and sales appeal.

In handling meat products, heavily tinned equipment is used to give a reasonable life without a heavy capital expense. Among the applications for tin are the galvanized-iron ham molds. They have long been in service.

In some packing plants, slaughterhouses, and retail butcher shops, tables and much other equipment are made of wood. And some packers prefer wrought iron for meat-cooking tanks.

Aluminum Kettles

Equipment of aluminum alloys is also used in the meat-packing industry. In the killing department, cans of aluminum alloys are used to store blood prior to its dehydration. In the canning department, steam-jacketed aluminum kettles are used for processing a wide variety of meat products prior to packing in glass or tin containers. Many items used to handle the products between the different departments are made of aluminum alloys. These include smoke sticks, aluminum hand trucks, dish pans, and other types of containers. Aluminum pans are used for mixing spice and seasonings for the various products. They are also used for baking such products as meat loaf. In the canning department, steam-jacketed kettles are used to prepare soup, and aluminum pails and pans are employed for holding large quantities of vegetables used in the preparation of the soups.

MILK AND MILK PRODUCTS

Dairy products furnish an ideal medium for the growth of many groups of bacteria and thus require great care and skill in their handling. Sanitary, easily cleaned equipment, maintained in proper condition, is a must.

Stainless steel has largely replaced other metals, although one still finds considerable "dairy metal" or "white metal" (nickel alloys) in pipes and fittings, tank outlet valves, and sanitary milk pumps. The dairy industry is perhaps using stainless steel more extensively than any other branch of the food field. It is generally used wherever the product comes into contact with metal. This is true in the case of various types of coolers, storage tanks, truck and railway tanks, where the milk may stand for several hours. A large percentage of batch pasteurizers are fabricated of stainless steel, as well as most flash or high temperature units.

Other pieces of stainless steel equipment in dairies include such items as vacuum pans, dump and weigh tanks, receiving tanks, filters, pumps, balance tanks, bottle fillers, ice cream freezers,

and the contact parts of many others such as homogenizers and packaging machines.

Where brine is used for cooling purposes, stainless steel should be avoided, except when the equipment can be readily taken apart daily for flushing down with water. An example of this is the plate cooler, where brine flows on one side of the plates and milk on the other. These coolers can be quickly opened and washed to prevent corrosion. Jackets of stainless steel pasteurizers or holding tanks should not be flooded with brine, since corrosion would then be a serious problem.

Aluminum was used to some extent in the construction of dairy equipment. Some plate-type heaters, coolers, and filters have been constructed of this metal. Because of corrosion and pitting when used in connection with other metals, a good deal of it has been replaced by stainless steel. It is now used in limited quantities for milk cans and butter churns and in considerable amounts as foil hoods for milk bottles.

Many milk rail-transportation and truck tanks were formerly made of glass-lined steel, but these are being replaced with stainless steel because of the saving in weight. This construction is being used for steam and brine-jacketed equipment, including batch pasteurizers.

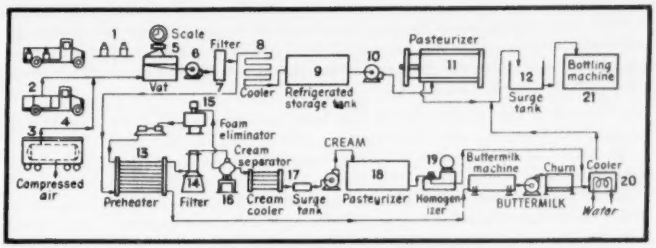
Much experimental work has been done on the use of glass tubing to replace metal sanitary tubing for milk lines. Some dairies have installed such pipe lines. If board-of-health approval should be generally obtained so they need not be taken down for daily washing, considerable economy of labor would be effected.

Tinned equipment has been used for years because of its ease of fabrication and low cost. There is no general attack on tin by sweet milk under normal conditions. Localized corrosion may be encountered in open containers. Black spots in tinned milk cans have been caused by leaving a stirrer of nickel or other metal superior to steel in the cans overnight. Tinned copper has been replaced to a great extent by stainless steel, although tinned-copper surface coolers are still available.

Nickel and Monel are not considered entirely satisfactory for milk-handling equipment, since they are corroded by cooling milk. Nickel alloys, such as dairy metal or white metal, have been extensively used for sanitary pipes and fittings, outlet valves, and milk pumps. Because these contain copper, which is soluble in milk, some large dairies and schools discourage their use.

The alloy Inconel is resistant to corrosion by milk under all conditions and is recommended by some where resistance to corrosion by refrigerating brines is required. It should be pointed out, however, that most fabricators will make no guarantee of brine-cooled coils or jackets made of this material.

Some mild steel milk storage and whey storage tanks have been coated with a phenolic resin protective coating. This and other coatings also have been applied to some truck tanks. In considering the use of a phenolic coating one should have the manufacturer's guarantee that no free phenol will be given off. Free phenol not only would affect the flavor of the product but would also be apt to give a positive phosphatase test.



"IN THE DAIRY INDUSTRY, stainless steel has largely replaced other metals." Materials used: (1) stainless steel, aluminum, (2) stainless steel, aluminum, glass-lined steel, phenolic-resin-lined steel, (3) stainless steel, aluminum, glass-lined steel, phenolic-resin-lined steel, (4) aluminum, glass, stainless steel, (5) stainless steel, (6) stainless steel, tinned bronze, (7) stainless steel, (8) stainless steel, aluminum, (9) stainless steel, aluminum, glass-lined steel, (10) stainless steel, (11) aluminum, stainless steel, glass-lined steel, phenolic-resin-lined steel, (12) aluminum, stainless steel, glass-lined steel, (13) stainless steel, aluminum, (14) stainless steel, aluminum, (15) stainless steel, aluminum, (16) stainless steel, aluminum, (17) stainless steel, aluminum, (18) aluminum, stainless steel, glass-lined steel, (19) stainless steel, aluminum, (20) stainless steel, aluminum, (21) stainless steel, aluminum.

NUT PASTES

Advanced equipment and methods have improved the quality of nut and pit pastes and speeded operations in their manufacture. The industry is nearing the goal of making the entire process continuous, with many steps already on that basis. Remaining batch operations are so timed that the present production is a constant flow. In the modern plant, much of the equipment is steel, but some stainless steel and aluminum is used[7].

Three pastes—almond, kernel, and macaroon — are made, respectively, from almond nut meats, apricot pits, and a combination of the two, all with a medium and added moisture.

First, nuts are dumped into a continuous bucket elevator feeding a hot-bath soaker equipped with a continuous stainless-steel mesh belt, where skins are softened. For removal of skins, nuts then travel to an air-blast blancher and next are conveyed in a suction line-equipped trough. The nuts finally fall on stainless-steel inspection belts.

Prussic acid, occurring in the nuts and pits, is partially removed by the washes. After the nuts are dried in high-speed basket-type centrifugals, comminuting machines grind them into bits. The bits drop into aluminum trays for delivery to the mixing kettles. The kettles remove the remaining prussic acid fumes and reduce the bits to a paste of 11 percent moisture content. Pastes are packed direct from kettles and transferred to air-conditioned storage.

OLEOMARGARINE

Originally, much of the margarine plant was constructed of wood. In many respects, wood, even hardwood, is an unsatisfactory material owing to its porous nature. It was likely to be a breeding ground for microorganisms. It has, however, the advantage that when wet the margarine does not adhere to it, as it does to metals.

However, the cleaning problem was a difficult one, and the development of sponginess made frequent replacement essential. Attempts were made early to extend the use of metal wherever possible[8].

Tinned steel and tinned copper were the first to be tried; the presence of salt in the aqueous phase and acidic products made the employment of plain steel useless. When it was found that some metals, particularly iron and copper, were oxidation promotors and that certain types of deterioration in fat were due to oxidation, the importance of keeping the tin coating of

Quick Quiz on Materials

Here are five questions drafted by FI editors to check your knowledge of materials used in the construction of food plant equipment. Get out your pencil and in each of the five circle the answer you think correct. Then compare with the answers on p. 111.

1. Trend in the dairy industry has been toward more use of: (A) Tinned copper, (B) stainless steel, (C) Durimet 20, (D) high-silicon iron.

2. Which of these metals is barred from use in contact with liquid sugars? (A) Aluminum, (B) copper, (C) stainless steel, (D) lead, (E) tin.

3. Of the following materials, which is coming into wider use for fermenters, mash lauter tubs, cereal cookers and hop separators in breweries? (A) Wood, (B) Neoprene, (C) nickel-clad steel, (D) Durimet 20.

4. Which one of the following materials would not be chosen for constructing an apple sauce cooker? (A) Stainless steel, (B) wood, (C), Monel.

5. Salting and curing of pickles is commonly done in tanks of: (A) Concrete, (B) Pyrex glass, (C) wood, (D) Saran.

the iron and copper surfaces in perfect condition was further emphasized. At the same time, attempts were made to find uncoated metals which were inert in the presence of margarine. Aluminum, Monel, stainless steel, and (for some purposes) nickel have established themselves and are now found in modern plants, where they are replacing wood.

The metals must also be resistant to the chemicals and detergents used for cleaning the plant. Tanks and ripening vats for milk, and tanks for melting fats, are therefore made of tinned steel, aluminum, stainless steel, or glass-lined steel. Copper is avoided as far as possible, and where used it must be extra heavily tinned and kept well tinned. Churns and emulsifiers are made from tinned steel or stainless.

At present, cooling drums are generally made of steel. But it would be an improvement if stainless steel or nickel coating could be used. This is because the presence of salt in the emulsion, as well as lactic acid, and the low temperature of the surface, which leads to condensation of moisture when the drum is not in use, make it essential to take special steps to protect the steel surface against corrosion by keeping it well oiled. Wood is still used a good deal in transport containers. Wooden kneading rollers have been replaced by granite rollers made of a special close-grained porphyry.

Chromium plating does not appear to have been employed to any extent in margarine plants. Here it might prove useful for such equipment as cooling drums and kneading rollers.

Hitherto, plastics have found little application for equipment and utensils, for the latter must be capable of withstanding acids, alkalis, greases, salt, high and low temperatures, detergents, disinfectants, scrubbing and cleaning. In addition, they must not impart any taste to the products.

Inconel is used for steam-jacketed cooking kettles. Nickel-clad steel vats are used for storage.

OYSTERS

Type 316 stainless steel and Monel are used for the fabrication of equipment for plants packing oysters. The resistance of these metals to sea water and the general cleanliness resulting from their use make them favorites.

To describe the process: Oysters fresh out of the shells are put into shucking pails[10]. The contents of the pails are dumped onto a skimming table. The bivalves are then carefully rinsed and inspected for shell fragments, after which they are measured into a perforated container. Oysters are now put into aerated washing tanks. After the 15-min. washing cycle, the oysters are ladled out of the aerated washing tank onto the skimming table and packed for shipment.

PEANUT BUTTER

While there are few if any corrosion problems in peanut-butter manufacture, the usual requirement of cleanliness calls for stainless steel or other special material.

Ordinary steel is all that is necessary for the various pieces of equipment used for roasting, cooling, and blanching. However, the grinding of the peanuts and the filling machine are stainless steel.

The process is relatively simple, consisting of shelling, dry roasting, and blanching the peanuts, followed by fine grinding. Salt is put in to improve the flavor. And small quantities of other materials, such as hydrogenated fat or glycerin to prevent oil separation, lecithin or antioxidants to control rancidity, and "secret" ingredients, are sometimes added.

PEPPERMINT OIL

In the Northwest, peppermint is said to give up to 100 percent greater yields of oil than in other regions. A continuous still for fractionating the oil has replaced small pot stills in a new plant in the state of Washington[11].

When the peppermint plant matures, it is cut like hay and allowed to wilt in the field until it loses about 30 percent of its moisture. The leaves are then packed into covered wooden tubs on the farms. Steam from a small boiler is fed into the bottom through a perforated pipe. It filters up through the leaves and drives off the oil—which escapes with the steam to a condenser and then a decanter. Here the oil rises to the top and is drawn off into galvanized drums.

The drums are stored at 45 deg. F. until needed, then taken by hand truck to the still. The oil is pumped into stainless-steel blending tanks. Blended oil is pumped into a 1,500-gal., tin-lined copper holding tank at the bottom of the still. Then another pump sends it to the "heads" column.

This column has horizontal bubble-cap plates at 1-ft. intervals. It is of tin-lined copper construction—as are the 0.5-to-4.0-in. pipes in the still. Low-pressure steam enters near the bottom and escapes at the top. Oil enters the column at one side of the middle plates.

Light, low-boiling fractions in the oil rise to the top as vapors with the steam, pass through a condenser and a reflux decanter. Oil rises to the top and drains off through a weir back into the column. Water goes under a baffle plate rising from the bottom of the decanter and is piped off into a stripper. Here residual oil is boiled off and goes through a condenser to be sent back to the heads column.

Medium- and high-boiling fractions are drawn up by a pump into the "products" column; steam is again introduced at a slightly higher temperature. The process is repeated here, the residual light oils rising as vapor into the condenser, and then going to the decanter. Water goes to the stripper, and recovered oil returns to the heads column. Finished oil is drawn off one of the upper pasteurizing plates, decanted to separate oil from the water, then piped into the stainless-steel storage tanks. Bottom oils from the products column are drained off as waste tars.

Refined oil is pumped from the product storage tanks into blending tanks, then goes through a 15,000-rpm. centrifuge, which takes out excess moisture and solids.

PICKLES

The salting and curing of pickles is done in wooden tanks. The tanks can be made of cypress, fir, pine, or redwood, with tapered or straight sides.

Cypress tanks, though most expen-

sive, are the best under all conditions, especially if they are erected in the open, because cypress does not dry out so quickly as other woods. Fir is much cheaper and would be very efficient under cover if the tank is kept full at all times. But it must never be permitted to stand empty for any length of time, for fir dries out very quickly, soon causing the tank to leak. And thereafter it is very hard to keep tight[12].

Each tank should be supplied with a wooden pump. Where electric power is not obtainable or where labor is cheap, the common iron pitcher pump with 1¼ in. galvanized-iron pipe and check valve is used, but in most places, the electrically driven rotary pump is preferred. One firm is using a pump consisting of a pump leg, a stainless steel propeller and a small electric motor. Power consumption is very low.

In some plants processing pickles, a 10 to 15 percent brine solution, at 70 to 100 deg. F., is recirculated by means of a high-silicon iron pump.

There are few metals that will successfully withstand the vinegar salt combination in pickles. Notwithstanding the corrosive nature of these combinations, they are successfully handled with 18-8 stainless steel, but on account of the unusually corrosive nature, precautions must be observed to wash and rinse all equipment thoroughly after use; otherwise, pitting may eventually occur[13]. Stainless steel is in use for centrifugal pumps and pipe lines conveying vinegar from wooden tank cars to storage tanks.

SALAD DRESSINGS

Production of salad dressings is a severe test for equipment. Vinegar, salt and other ingredients are corrosive to many materials. And oils can be handled in black iron equipment. Vinegar is stored in wooden tanks and handled by stainless steel pumps, pipe and valves. The processing of these and other raw materials that go to make up the salad dressing is done by stainless steel equipment.

Inconel, 18-8 stainless steel, and the 17 percent chromium steel are the most suitable materials for whips and beater bowls in contact with mayonnaise at atmospheric temperature, because both are immune to significant attack and free from tarnish, which may or may not be considered a serious objection[14]. The manufacture of cooked salad dressing requires the use of materials for cooking kettles that can withstand the effects of prolonged contact with boiling solutions of vinegar and salt. Such mixtures are very corrosive. Here, Monel, nickel, and Inconel exhibit rather high rates of corrosion, and the 18-8 stainless steels, though they possess low rates of attack as measured by weight loss, are subject to rather severe local attack.

Experience has demonstrated, however, that 18-8 molybdenum stainless steel, Type 316, is the best choice for handling such mixtures[11]. Even so, this stainless steel shows some tendency toward pitting. However, this can be kept to a minimum by having the surface of the steel as highly polished as possible and by cleaning the surfaces to remove acid salty solids after each use.

Use of the various materials in a specific plant are given for a highly integrated continuous processing system in Ohio[15]: Blended oils, chiefly corn and cottonseed, are delivered to the plant in tank cars. Black iron pipes and fittings and a centrifugal pump are used to unload the tank cars. The oil is then pumped directly into black iron storage tanks.

Distilled, aged-in-wood vinegar arrives at the plant in wooden tank cars. It is pumped by a stainless-steel centrifugal pump through stainless-steel pipes into cypress tanks. Other raw materials are received in a variety of containers and stored.

Salad dressing is a mixture of starch paste and mayonnaise—an emulsion of starch paste and vegetable oil, using egg as the emulsifying agent. The paste is prepared by cooking the starch slurry and then cooling the paste before it is added to oil, spices, and eggs in the premixer.

The starch-slurry mix is prepared in a stainless-steel slurry tank, which is equipped with a portable propeller mixer and set upon a tank scale. Water and vinegar are first weighed into the tank, then starch, stabilizer, salt, and sugar. This starch-slurry mix is then pumped into a stainless-steel holding tank. Durimet 20 is giving excellent service as mixing equipment for mayonnaise and salad dressing.

A steady flow of slurry from the holding tank through the Votator processing equipment is provided by a piston pump. Here, the slurry is cooked and cooled. Each unit consists essentially of concentric tubes which form two annular spaces around a central agitating shaft. The heat-transfer medium flows through the outer space, the product through the inner one around the shaft, and the heat passes through the tube wall from one to the other. To conserve heat, the outer tube is jacketed with insulation, which, in turn, is covered with stainless steel.

From the cooking and cooling units, the paste flows into stainless-steel gelling tanks. These tanks permit further gelatinization and hold the paste ready for the premixers.

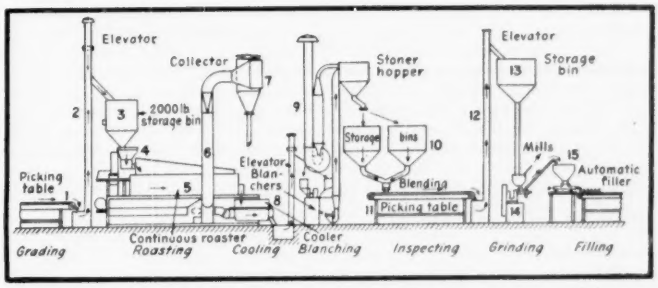
Salad dressing, sandwich spread, and mayonnaise are prepared in the premixers, which are equipped with impellers. In the manufacture of salad dressing, starch paste is pumped through a preset recording meter to stainless-steel premixers. Here, too, metered quantities of cooled salad oil are delivered from oil-storage tanks and mixed with eggs, starch paste, and combination spice oils. Mayonnaise and sandwich spread are also prepared at this point. Starch paste is omitted from the mayonnaise formula, while vegetable relish is added to a mayonnaise base in the production of sandwich spread.

From premixers, dressing products are continuously discharged through a mayonnaise machine, which completes the emulsification. Mayonnaise, salad dressing, and sandwich spread then flow continuously to the packaging line.

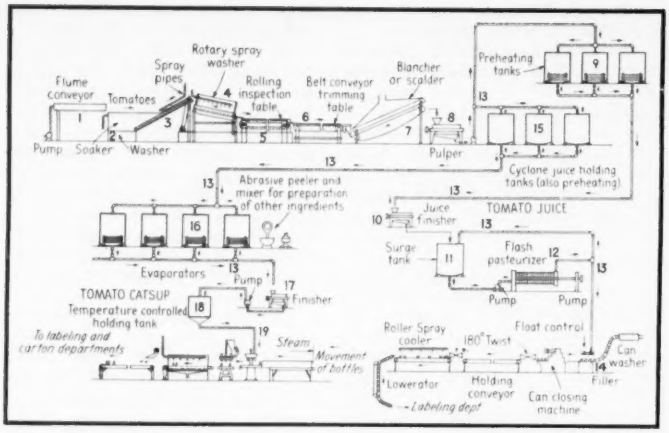
TOMATO PRODUCTS

The juice of tomatoes contains corrosive acids, citric and malic, which give trouble unless special materials of construction are used for equipment.

Peanut Butter



"ORDINARY STEEL is satisfactory for much of the equipment used in preparing the nuts." Materials used: (1) heavy canvas, (2) steel, (3) steel, (4) steel, (5) steel, (6) steel, (7) steel, (8) steel, (9) steel, (10) steel, (11) heavy canvas, (12) steel, (13) steel, (14) stainless steel, (15) stainless steel.



"EXTENSIVE USE is made of high-silicon iron and Durimet 20 in the production of tomato juice." Materials used: (1) steel, (2) steel, (3) steel, (4) steel, (5) steel, (6) steel, (7) steel, (8) stainless steel, (9) stainless steel, glass-lined wood, (10) stainless steel, (11) stainless steel, glass-lined steel, (12) stainless steel, (13) glass, stainless steel, (14) stainless steel, (15) stainless steel, (16) stainless steel, glass-lined steel, (17) stainless steel, (18) stainless steel, glass-lined steel, (19) stainless steel.

Such materials as glass-lined steel, stainless steel, wood and copper are in use.

At one time it was considered difficult to can tomatoes without impairing the flavor and vitamin content, but stainless steel proved to have no chemical reaction. Stainless steel equipment employed by the canning industry includes kettles, pans, pulping equipment, transfer lines, and filling machines. In many tomato products plants there are batteries of jacketed stainless steel cooking kettles with portable mixers.

In the case of tomato juice preparation, the juice is delivered hot from holding tanks to finishers, which remove the last traces of shreds, discharging into stainless steel tanks from which the juice is pumped to holding tanks supplying flash pasteurizers. Juice flash pasteurizers are equipped with stainless-steel feed and delivery lines, etc.

Glass-lined steel tomato cookers with stainless steel or copper coils are also used. In some plants, glass-lined tomato-juice tanks with conical bottoms receive juice from the finishers and act as balance tanks before the initial concentration in glass-lined vacuum pans. Glass-lined storage tanks are used. Glass piping is now in use in a few plants for handling tomato juice.

Extensive use is made of high-silicon iron and Durimet 20 in the production of juice and catsup. The high-silicon iron pumps, valves, and piping have proved entirely satisfactory after several years of continuous service.

For tomato paste, glass-lined steel is used for evaporators, storage tanks and other equipment and is said to be very efficient and generally satisfactory. Stainless is also successful for these items of equipment. Some plants are using steam jacketed nickel kettles for evaporation of juice to paste.

In the Atwater, Calif., plant of the Capolino Packing Corp., tomatoes are dumped into high-pressure washers. They are then elevated from the washers to inspection belts and discharged into a scalder and crusher. Pulp is next pumped through vacuum tubular preheaters to cyclone pulpers, then passed through finishers to storage tanks and kept at 185 deg. F. Actual concentration of this tomato pulp into paste takes place in stainless steel calandria-type evaporators.

When the desired concentration is reached, the tomato paste is piped to glass-lined, steam jacketed, totally enclosed tanks, equipped with stainless steel agitators and automatic steam controls. From these storage tanks the product is pumped through vacuum preheaters to bring the temperature to 195 deg. F. Then it is fed to filling equipment.

Somewhat different equipment is used in the Turlock Cooperative Growers plant at Modesto, Calif. Here, the finisher juice in the paste plant is stored in glass-lined conical bottom tanks. The juice is then drawn into a glass-lined evaporator. The type of the evaporator installed here is a glass-lined steel calandria unit. From the evaporator, finished paste is drawn into a jacketed, closed, glass-lined balance tank.

In making purée, glass-lined vacuum pans are in use. Some plants use an open glass-lined cooker with a single heater coil for concentrating tomato pulp to purée. In making catsup, a glass-lined deaerating unit is employed by some engineers.

Indoor and outdoor tomato-pulp transportation lines of glass piping are in use. A catsup-cooking kitchen uses such a glass pipe line for hot tomato products.

Tomatoes are being dried in slices and packed in that form for stewing. The tomatoes are washed, steamed, or dipped in boiling water to loosen the skins, chilled in cold water, peeled and cored by hand, sliced, spread one layer deep on trays, and dehydrated at not above 150 deg. F. to less than 5 percent moisture. Monel screen, or other screen not attacked by acid, should be specified.

Some copper and its alloys are in use in tomato plants. And vacuum tomato cooking pans with the inside surfaces nickel plated have been used successfully.

SYRUPS

Here, the term "syrups" refers to nonacid and acid syrups encountered in beverages, canned foods, fruit juices, jams, jellies, and preserves.

Metals commonly used for water lines are not satisfactory for syrup handling. The acidifying agents and the sterilizers generally used seriously corrode the ordinary metals. Corrosion means contamination of the syrups and, consequently, of the final beverage[20].

Stainless steel, glass-lined steel, nickel, and high-nickel alloys are the most universally satisfactory materials. Block tin and high-quality bronze are suitable in certain instances. Suitable only under less severe conditions are aluminum, copper, and stoneware. In certain types of tubing for special purposes, glass and rubber are satisfactory.

Block tin tubing has been most used in the past for syrup piping because of its availability and the ease with which it can be formed and fitted. However, it is not the best material with respect to corrosion resistance. Also, it tends to become brittle with age, and it will sag unless continuously supported, resulting in sections that do not drain properly. Tin coatings on stronger metals overcome these difficulties, but there is danger of contamination when the tin wears away and exposes the bare metal.

Recently, thin tubings of high-strength, made of high-resistant metals like stainless steel, have become available. These satisfactorily serve for all syrup piping. The tube walls are too thin for use with screw fittings, hence welded, sweated, or compression fittings are used.

Heat-resistant glass tubing and glass-lined pipe are excellent for syrup lines, but being fragile they need careful handling. Glass tubing is advantageous because of the ease with which the contents can be examined.

To be absolutely safe, equipment should be made of materials that will withstand the most severe conditions encountered. Suppose equipment for handling a nonacid simple syrup were made of some of the less resistant materials. It would be possible that, through accident or change in routine, an acid product might be put in such equipment. The result would be contamination of the product.

The most satisfactory materials to use with hot-process syrups without acid are: Stainless steel, glass-lined steel, nickel, nickel-copper alloy and block tin. Stoneware is not satisfactory.

For handling hot process syrup with acid, stainless steel and glass-lined steel are satisfactory, while aluminum, copper and stoneware are unsatisfactory.

Cold process syrup without acid is not difficult. These materials can be used: Stainless steel, glass-lined steel, nickel, nickel-copper alloy, bronze, block tin and stoneware.

In the case of cold process syrup with acid, stainless steel, glass-lined steel, nickel, nickel-copper alloy and stoneware are satisfactory. Copper should not be used.

For carbonated water, stainless steel, block tin, bronze, and silver plate are satisfactory. Copper and aluminum are unsuitable.

CANE SUGAR

For operations involved in the recovery and purification of sugar from cane—i.e., making and refining the raw sugar—most of the equipment is fabricated from mild steel. But some special materials, such as copper and stainless steel, are used.

Copper, steel, and cast iron have been employed for decades in contact with liquid sugars. The serviceability of those metals is evidenced by the fact that there are now in operation many vacuum pans, liquor tanks, and bone-char filters with ages ranging from 50 to 80 yrs.

In recent years, many changes have been made in the processing of sugars. New equipment has been developed, and there have been changes in construction, creating new problems in metals. Each refinery has its own variations of processing and its own theories on metals. The result is that several metals indicate good service but have not been in service long enough, or in sufficiently wide variety of operating conditions, to warrant full approval.

Tin, zinc, copper, stainless steel, aluminum, and Monel are satisfactory in contact with liquid sugars. As far as is known, any metal can be used except lead, which is barred both voluntarily and legally. The questioning of many experienced refiners reveals no instance of the purity of the sugar being affected by metals. And considering the frequent routine tests made by government agencies and large food corporations, the evidence is quite convincing.

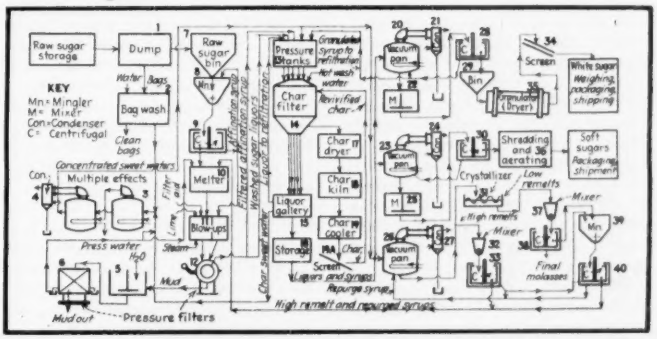
Very little research has been done on sugar corrosion, and the behavior of alloys is so unpredictable that values can be determined only by test. The addition or change of a small amount of alloying metal may mean success or failure. In one special process, where corrosion was above normal, all forms of copper, including Monel, were unsatisfactory except one alloy with a copper content of 96 percent. This same alloy failed when used in another process where the corrosion was less than normal. In one process, an aluminum alloy was used and immediately turned black: On the other hand, another alloy of the same metal was satisfactory. Both alloys had an aluminum content of 98 percent and the same three alloying elements. The difference was caused by changing the relative proportion of the three minor elements by less than 1 percent.

Scaling, confined generally to steel and cast iron, causes minute black specks in the sugar which, though not harmful in any way, might be objectionable to a customer if he should find one in a piece of clear candy. Specks cannot be eliminated, so they are a constant irritation to the refiner, who does his utmost to keep them at a minimum.

The above discussion has concerned corrosion of metals completely submerged in sugar solutions. A much more corrosive action occurs when vapors are present in an enclosed vessel. The modern trend is to enclose such equipment as liquor tanks and blowups, which from time immemorial have emitted vapors, causing a mild corrosion of structural steel and destroying paint. Refineries have tried many alloys, but there is little agreement in results, and all are seeking better materials.

Vapors arising from bone-char processes are strongly corrosive. Those coming from the kilns and dryers are not corrosive if their temperatures are maintained above the dew point. Cast-iron retorts in kilns have been superseded by thin-walled retorts of 16 to 18 percent chrome steel. The only corrosion of these retorts comes from fuel combustion gases and is not too harm-

Cane Sugar



"AS FAR AS IS KNOWN, any metal except lead can be used with liquid sugar." Materials used: (1) cast-iron body, steel shaft, cast-steel breakers, (2) cast iron, steel, (3) cast iron body, copper tubes and sheets, (4) cast iron, (5) steel, (6) cast-iron body and plates, brass screens, (7) wood lining, (8) steel, (9) steel casings, steel or bronze basket, steel spindle, (10) steel, (11) steel, (12) cast body, bronze leaves and screens, (13) steel, (14) cast iron, (15) copper and cast iron, (16) steel, (17) cast iron, (18) iron castings with chrome steel tubes, (19) iron castings with sheet-iron tubes, (19a) steel, (20) copper, (21) cast iron, (22) steel, (23) copper, (24) cast iron, (25) steel, (26) copper, (27) cast iron, (28) steel casings, steel or bronze baskets, bronze screen, steel spindle, (29) wood lining, (30) steel casings, steel or bronze baskets, bronze screen, steel spindle, (31) steel, (32) steel, (33) steel casings, steel or bronze baskets, bronze screen, steel spindle, (34) steel frame, bronze screen, (35) steel, (36) steel, brass, (37) steel, (38) steel, (39) steel, (40) steel casings, steel or bronze baskets, bronze screen, steel spindle.

ful if the carbon content of the metal is below 0.1 percent. Char waste water contains some sulphur, but practically all of that element flashes off in the open gutters in the liquor gallery.

There are many cast-iron and steel bodies that have been in service in the industry for many years and have corroded to the point where they will have to be replaced in a few years if further corrosion is not prevented. This state of affairs offers quite a field for protective coatings, and many tests are being made. Care must be taken to avoid coatings that contain elements which should not be used in contact with food. Some experimental programs have been prolonged because tests proved misleading.

In some isolated cases, more expensive coatings have lasted longer but not sufficiently to warrant the additional expense. Some expensive coatings will give a life of 8 to 10 yr., and with some patching will probably last 5 or 6 yr. longer. At the present time, there is not sufficient field experience to indicate the most suitable type.

The clarification of sugar syrup frequently involves the use of char, which has to be filtered out of suspension with or without the use of filter-aid material. For this service, Worthite pumps have been used successfully over a 7-yr. period. Sugar evaporators or pans have been unloaded by centrifugal pumps made of the same alloy.

VANILLA EXTRACTS

For many years, wood was standard for construction of equipment in plants producing vanilla extract, and it is still used in some plants. However the newer plants have gone to stainless steel. Both materials are used to avoid iron pickup, which causes turbidity. In some plants, glass-lined steel is used for percolators and for storage of the finished extract.

In one modern extraction plant, it has been noted that the essential pieces of equipment are of stainless steel, while the other equipment is ordinary steel[17]. The first step in the actual processing is the shredding of the whole beans. This is done, in a delicately balanced comminuting machine, without raising the temperature of the vanilla. The beans are shredded into particles of small enough size to permit thorough penetration of the solvent and efficient solution of the bean extractive matters. The shredded vanilla is weighed carefully to the requirements of the batch formula and is then ready for extraction.

In the latter process, dilute ethyl alcohol is used almost universally as the solvent, and to the trade, the extracting solvent preparation is known as the "menstruum." To obtain the best results, the menstruum should contain approximately 50 percent ethyl alcohol. Before coming into contact with the vanilla, the menstruum is always mixed thoroughly. It will extract nearly all the vanillin, volatile oil, water-soluble constituents, and most of the color and resins—though it will not extract the undesirable gum, fat, and wax.

In order to take out the vanilla, the shredded fruit is placed in the menstruum in an extractor. This, basically, is a specially designed, stainless steel-jacketed tank in which the vanilla and menstruum are continually agitated with a churning motion for a period of 24 hr. and at a slightly increased temperature. This agitation assures the contact of all the finely divided vanilla particles with the warm menstruum and allows an extraction as complete as it is possible to get with the initial menstruum.

When this is accomplished, the menstruum is drawn off from the solids into a stainless steel holding tank. A second menstruum is pumped in with the "beans" and is handled in the same manner.

After separating the second menstruum from the solids, the beans are pumped from the extractor into a screening tank, where they are washed twice with water. They are then pressed in pads in a hydraulic press, under approximately 300 tons of pressure, in order to remove the alcohol.

All the extracts and wash water are combined and filtered—either through a plate-and-frame filter or a horizontal plate-type filter with the aid of diatomaceous earth—into stainless steel storage tanks. Here, the batch is tested, built to the proper alcohol content and volume, and then allowed to age for a minimum of 3 weeks.

From the aging tanks, the finished extract is pumped, when ordered, to a bottling machine for packaging in gallon jugs or into barrels for shipment to the customer.

VEGETABLES

In the dehydration of vegetables, the trays used to carry the product through the tunnel dryer have frames of pine. The bottoms are screens. For non-acid vegetables, galvanized screen has been used, but Monel screens are preferred, since they are more resistant to corrosion. For acid vegetables such as rhubarb and tomatoes, it is important that Monel or wood-slat trays be employed. The disadvantage of Monel is the fact that it cannot be used for blanching the vegetables in steam. If used for tomatoes, the slats of the wooden trays should be coated generously with confectioner's slab oil (an edible mineral oil) in order to minimize sticking of the dried products.

Rubber canning conveyor belts employ a white cover to promote cleanliness and facilitate efficient sorting. They are constructed so as to be easily cleaned with soap and water, are waterproof and impervious to the acid action of vegetables.

In canning vegetables, brine is often added to the cans. Copper, brass, and bronze are useful in equipment for protection against corrosion by this brine[18]. But in the case of certain products like sweet corn, which is subject to discoloration by very minute traces of copper, it is the best practice to tin the copper, brass, or bronze surfaces coming into contact with the product. Tomato juice and canned tomatoes contain a highly corrosive acid, and again these metals are used for protection wherever the product comes into contact with the machinery. For example, bronze pump parts are used to handle tomatoes or tomato juice. Equipment for crushing and straining tomatoes is made entirely of brass, bronze, and another copper alloy. It is, of course, important that the equipment be thoroughly clean and bright before using it in contact with foods—a precaution that is important for any material of construction.

Even vegetables with peculiar characteristics or flavors that require special handling care have been satisfactorily processed in stainless-steel equipment.

One canning plant has several thousand feet of glass pipe for conveying those vegetables readily contaminated.

VINEGAR

The acetic acid content of vinegar causes it to corrode some metals. The acid content in some cases is as high as 15 percent. It is therefore necessary to use special materials for vinegar production and handling.

Wooden storage tanks have been used for the alcohol employed in making vinegar. But vinegar deteriorates wood, and modern usage trends to stainless steel construction. The pumps, pipe, and fittings for pure alcohol need not be anything other than steel, although here again the present trend is toward stainless.

For the pump, pipe and fittings used to denature alcohol, a corrosion-resistant alloy is required. High-silicon iron mixing nozzles are used in some plants to get quick mixtures easily. The vinegar denaturing tank may be of wood. The wash storage tank is generally of wood, but all pipe fittings and pumps must be of corrosion-resistant alloys from the feed valve on.

The generator is a covered wooden tank. It is equipped with stainless steel, gage-glass valves to indicate the height of liquid in the well space. The tank outlet, piping, valves, pump cooler, sparger, and meter must be

corrosion resistant. The air piping should be stainless, for this pipe runs into the generator where contact with the vinegar is made.

The packing is beechwood shavings, corn cobs, pecan shells, coke (iron free), or pumice—any material which will give surface and not deteriorate while wet.

Intermittent spargers are sometimes tee-shaped wood troughs. Continuous spargers may have spray heads of Durimet cast bodies with multiple stainless disks for the umbrella-like spray. The rotary-type spargers must be made of stainless, with high-silicon iron pivot bearing. A centrifugal pump is generally of high-silicon iron or Durimet. It is used to unload the generator.

Some plants use stainless double-pipe coolers which serve not only to cool the vinegar but also to convey it from the pump up to the sparger at the top of the generator.

For accurate control of the process, flowmeters and thermometers are required. A visible float-type meter to measure vinegar and air is most satisfactory, the float being of Type 316 stainless steel as well as the welded fittings. All thermometer bulbs in the vinegar should be of Type 316 stainless steel.

Low Carbon for Pickle Brine

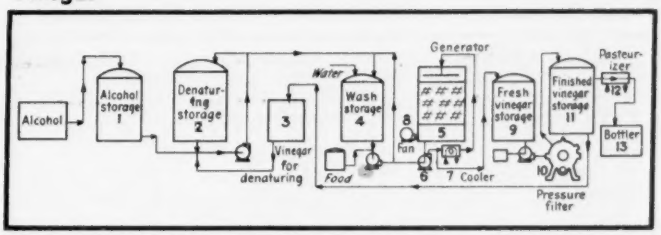
No corrosion problem is present with the air blower, but the piping is often stainless for appearance. Where it enters the generator, it must have a short piece of stainless steel pipe. All parts of the filter in contact with the liquid must be stainless. If the vinegar is in the form of pickle brine, it is essential that low-carbon material be used and that welding technics be good. The pasteurizer is a heat exchanger made of Type 316 stainless steel or high-silicon iron.

Often garlic, sweet basil, tarragon, and other flavors, are added to vinegar. Salt and sugar are added to pickle brines. The mixers are generally of relatively small size, and the process is batchwise; hence, wooden tanks with stainless fittings and mixing blades are required. The bottling apparatus must have stainless parts.

In all plants, wood was originally used for piping. This was later supplemented by hard rubber or high-silicon iron. In some later plants, Pyrex glass and stainless steel tubing are used. In one or two instances, Saran pipe has been installed. High-silicon iron requires more supports than hard rubber or Saran.

Pipe fittings are best in high-silicon iron because of cost, but if used with stainless tubing, the tubing must be flanged, which adds to the tubing investment. High-silicon iron or Durimet valves are most widely used, although many very small plants have used wooden plug cocks.

Vinegar



"THE ACETIC ACID OF VINEGAR causes it to corrode some metals." Materials used: (1) stainless steel, wood, (2) wood, (3) wood, (4) wood, (5) wood with spargers of wood, stainless steel or Durimet, (6) high-silicon iron, Durimet, (7) stainless steel, (8) steel, (9) wood, (10) stainless steel, (11) wood, (12) 316 stainless steel, high-silicon iron, (13) stainless steel. Piping: Wood, hard rubber, high-silicon iron, glass, stainless steel, Saran-lined steel. Valves: Wood, high-silicon iron.

Modern vinegar manufacture in this country is carried out in generators of the Frings, Ash, Owens, Lowy, etc., types. Alcohol is kept in storage tanks. It is denatured by mixing with vinegar in sufficient volume to give about 10 percent vinegar in the alcohol.

In the wash tank, the alcohol-vinegar mixture is diluted with water to give a mixture of 12 percent. Also, food for the bacteria is added—generally brewer's malt. This is all thoroughly mixed by pumping in circulation. A generator is charged with 3.5 to 4 gal. of wash per cu. ft. of packing. There is, in addition, a residual in the generator of vinegar of about an equal amount. The wash is recirculated over the generator through the sparger or spray head, and as the temperature rises owing to the bacterial action, water is admitted to the cooler or heat exchanger for temperature control. Air is supplied to provide oxygen for oxidation of the alcohol to acetic acid.

When the conversion progresses, the alcohol is reduced to about 0.25 percent, the acid increased to 10.5 percent, and the batch is ready to be taken off. Depending on the efficiency of conversion, this takes a period of 10 to 30 days. The average modern plant gets a batch off in 15 days.

The vinegar is placed in intermediate storage. Most plants filter the entire output through diatomaceous earth. White or distilled vinegar is often passed through a carbon filtration and polishing filter. This is especially required if the product is to be sold in clear glass.

WINES

Use of metals in the production and distribution of wines entails two problems, namely, corrosion and the effects of metals on flavor, physiological action, keeping qualities, and other properties of wine. The principal effects of the metals on wines concern color and sparkle. The influence of flavor and bouquet is much smaller for a given concentration of dissolved metal[19].

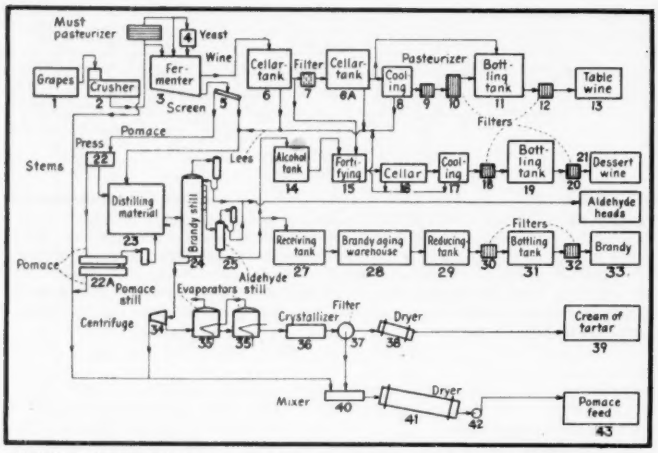
Very few metals are resistant to corrosion under all conditions existing in a winery. In choosing a metal, therefore, the only safe criterion is a test conducted in the winery at the place where the metal is to be used. Although the safest procedure is to use the most resistant metal indicated by such tests, it is not always the most feasible method. In many instances it is possible to use less resistant metals in the winery, provided they are used where they come into contact with the juices and wines during the early stages of production. This is possible because much of the iron content of musts is lost during fermentation and storage[20].

■ **Answers to Quick Quiz on p. 106—1. (B), 2. (D), 3. (C), 4. (B), 5. (C).**

Reasonably resistant metals are safe to use during crushing and fermentation, but only the most resistant metals should be in contact with stored and finished wines.

Corrosion is greatest at the crushers due to greater aeration, rigidity of flow, and freshness of fruit. Metals having greatest resistance here are stainless steels, cupronickel and Inconel. Those having least resistance are cast iron, steel, tin, Ni-Resist, and nickel. At the filter charger, corrosion is also considerable, because of agitation, erosion and aeration. Again, stainless steel and Inconel are most resistant.

Production, in general, has been considerably improved by modern equipment and some new technics[21]. The grapes are crushed in an Italian-type



"VERY FEW METALS are resistant to corrosion under all conditions existing in a winery." Materials used: (1) stainless steel and bronze, wood and concrete troughs, (2) stainless steel and bronze, (3) wood, concrete, (4) stainless steel, (5) stainless steel, bronze, copper, (6) wood, concrete, glass-lined steel, (7) type 316 stainless steel, (8) wood, type 316 stainless steel, glass-lined steel, (9) type 316 stainless steel, (10) wood, type 316 stainless steel, glass-lined steel, (11) glass, type 316 stainless steel, (12) type 316 stainless steel, (13) glass, type 316 stainless steel, (14) tinned copper, Inconel, stainless steel, (15) wood, type 316 stainless steel, glass-lined steel, (16) wood, concrete, (17) wood, type 316 stainless steel, glass-lined steel, (18) type 316 stainless steel, (19) wood, type 316 stainless steel, (20) type 316 stainless steel, (21) glass, type 316 stainless steel, (22) stainless steel, bronze, (22a) stainless steel, bronze, (23) wood, concrete, (24) copper, type 316 stainless steel, tinned copper, (25) copper, type 316 stainless steel, tinned copper, (26) copper, (27) tinned copper, Inconel, stainless steel, (28) oak barrels, (29) Inconel, tinned copper, stainless steel, (30) Inconel, stainless steel, (31) Inconel, tinned copper, stainless steel, glass-lined steel, (32) Inconel, stainless steel, (33) glass, Inconel, stainless steel, (34) stainless steel, bronze, (35) copper, stainless steel, (36) copper, stainless steel, (37) bronze, stainless steel, (38) steel, bronze, stainless steel, Monel, (39) steel, wood, bags, (40) stainless steel, bronze, (41) steel, (42) steel, (43) steel, wood, bags.

crusher-stemmer. They drop through holes in the cylinder into the sump, and the stems are kicked out of the open end of the machine.

Crushed grapes are pumped from the sump through a pipe to the vat. This pipe should be of stainless steel, but it is more often of plain steel or copper. While some metal is picked up by the must, it is believed that most of it is precipitated during fermentation with the yeast. Sulphur dioxide is added in the crushing vat as a solution of SO_2, as a gas, or as a bisulphite. All these forms are satisfactory.

In the making of white table wines and Angelica, also muscatel in some plants, the freshly crushed grapes are allowed to drain into a concrete sump and the resulting juice is pumped to a fermentation vat, oval, or tank. Fermentation vats are open, circular redwood units of rather shallow depth, or they may be open concrete tanks.

Tanks are either of redwood or of concrete. They differ from the usual fermenter in being covered and are generally deeper and larger. Ovals are usually of oak. They are employed for fermentation and aging of white table wine. Pumps should be made of corrosion-resistant bronze or of stainless steel, since traces of iron and copper cause haziness in white wines.

Wine filters are of several types. The two most common are (1) plate-and-frame filter presses of customary design, and (2) screen plus infusorial earth filters, in which a layer of filter aid is built up on hollow leaves made up of very fine screens of stainless steel or other corrosion-resistant alloy. Plate-and-frame filters are made of aluminum or aluminum bronze, stainless steel, or other corrosion-resistant material. For finishing or "polishing operations," a plate-and-frame pad filter in which asbestos pads are held between metal frames is generally used. Unglazed porcelain candle filters and also wood-pulp filters have been employed but have now been largely replaced by plate-and-frame or screen filters.

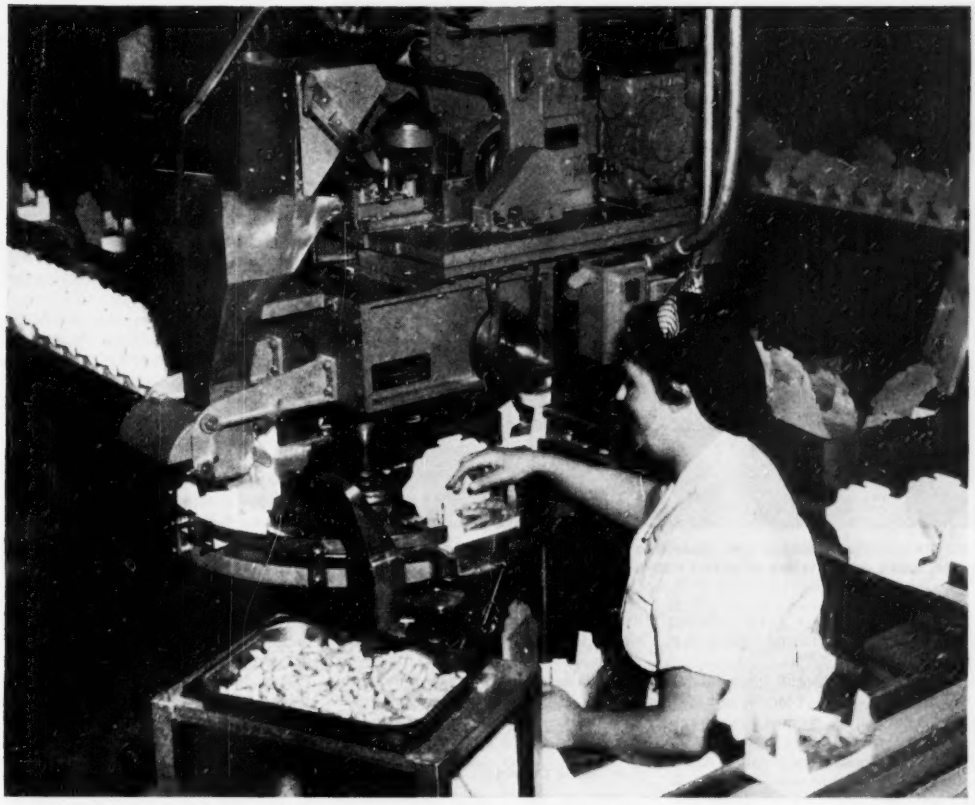
At present, stainless steel, aluminum, or aluminum alloy is used in pasteurizers. And instead of the old tubular heaters and interchangers, hollow plate pasteurizers have been installed to replace the old copper outfits. Also, beyond the pasteurizer there is usually a stainless steel holding chamber to increase the plate pasteurizer's capacity and to assure thorough pasteurizing.

The new wines are chilled by passage through the tubes of a direct Freon- or ammonia-cooled refrigeration machine. Wines are then bottled by means of stainless steel fillers.

References

1. Pheteplace, W. D., Jr. "Manufacturing of Applesauce in the Digester or Pressure Cooker," Food Industries, Vol. 38, No. 4, 193-94, 1938.
2. McWilliam, J. A., "Use of Stainless Steel in Chemical and Food Process Industries," *Murex Review*, Vol. 1, 1, 1948.
3. Shearon, W. H., and Burdick, E. M. "Citrus Fruit Processing," *Industrial and Engineering Chemistry*, Vol. 40, No. 3, 370, 1948.
4. Aluminum Co. of America, "Aluminum in the Chemical Industry," 33, 1944.
5. Gilroy, P. E., and Champion, F. A., "Aluminum and Fruit Juices," *Journal Society of Chemical Industries*, Vol. 67, 407-10, 1948.
6. Cole, C. S., "Copper, Brass and Bronze," Food Industries, Vol. 7, No. 12, 583-84, 1935.
7. *Copper Development Assn.*, "Copper in Chemical Plant," 57, 1936.
8. "Quality Nut Pastes by Modern Means," Food Industries, Vol. 20, No. 9, 1278-79, 1948.
9. Anderson, A. J., "Manufacturing of Margarine," *Transactions I.C.E.*, Vol. 22, 1, 1944.
10. "From Shell to Container," *Inco*, Vol. 22, No. 2, 11, 1948.
11. Bloomberg, R., "Botanicals," *Chemical Engineering*, Vol. 56, No. 4, 108-9, 1949.
12. Wormly, W. G., "40 Years of Pickle Salting," Food Industries, Vol. 11, No. 9, 486-88, 1939.
13. Mitchell, W. M., "Steel Alloys," Food Industries, Vol. 7, No. 12, 577-79, 1935.
14. Mason, J. F., Jr., "Resistance of Alloys to Corrosion During Processing of Some Foods," *Corrosion*, July, 1948.
15. Ziemba, J. V., "High Efficiency Attained on Multi-Product Line," Food Industries, Vol. 21, No. 3, 292-94, 423-24, 1949.
16. Scharf, J. M., "How to Avoid Contamination in Sirup Handling," Food Industries, Vol. 8, No. 1, 24, 43, 1937.
17. Breidenback, R. W., "Vanilla Extract Processing Speeded," Food Industries, Vol. 20, No. 12, 1772-74, 1948.
18. Cole, C. S., "Copper, Brass and Bronze," Food Industries, Vol. 7, No. 12, 583-84, 1935.
19. Muller, R. W., "Metals in Wineries," *Korrosion u. Mettalschutz*, Vol. 14, 385, 1938.
20. Mark, E. M., Caudron, D. C., and Cash, L., "Effect of Certain Metals and Alloys on Claret and Sauterne Wines From Vinifera Grapes," *Food Processing*, Vol. 2, 539-47, 1937.
21. Cruess, W. V., and Havighorst, C. R., "How California Wines Are Made," Food Industries, Vol. 20, No. 4, 522-30, 1948.

Yesterday by Hand, Today by Machine



FRIES go into cartons. Empties (left), coming from carton-forming unit, enter automatic weighing-filling machine. Operator check-weighs each 10-oz. package on scale specially built into machine. Cartons go on to wrapping.

Making French Fries on Continuous Line

High output of uniform quality fries has been achieved by Birds Eye through adoption of advanced equipment, technics, and control measures

JOHN V. ZIEMBA
Assistant Editor, "Food Industries"

Big-volume production of uniform quality frozen French fried potatoes has recently been attained by the Birds Eye-Snider Div., General Foods Corp., through the construction of an ultra modern plant adjacent to its frozen pea factory in Caribou, Me.

Soon after the new French fry plant began operating, a separate line was also installed to manufacture quick-frozen whipped potatoes from the small, top quality pieces of potatoes formerly discarded from the French fry line.

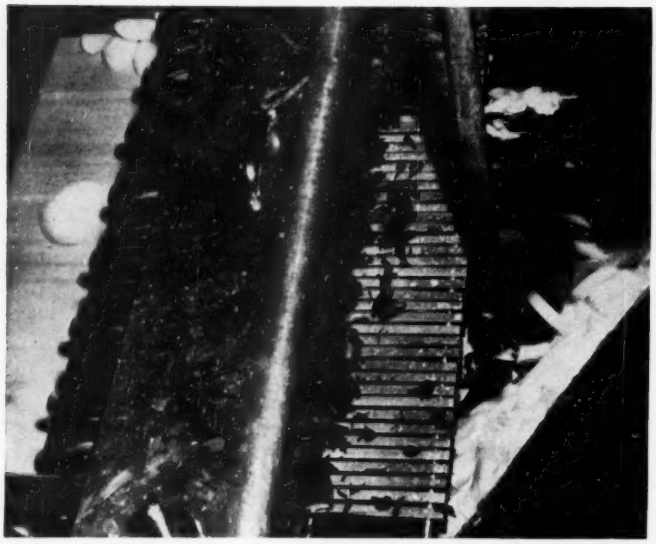
By the new arrangement, the freezing facilities now serve a dual purpose: To freeze peas from July 15th to August 20th and French fries and whipped potatoes from September 20th to May 1. What's more, this move assures trained personnel employment for an additional 7½ months during the year.

Especially notable is the efficiency attained by setting up the plant in the heart of Maine's potato land. Three clear-cut reasons for this are cited:

For Detailed Steps—

illustrating in sequence how French fries are processed—from washing the potatoes to packaging the fried strips—turn to graphic foldout picture-flow-sheet on pages 140-143.

From Potato Slices . . . to French Strips



SPECIAL cutting machine slits slices into uniform, half-inch French fry strips. Later, small end cuts are screened out in separator.

1. Company buyers have a better opportunity of purchasing quality raw stock.

2. Costly, long distant shipments of raw material have been eliminated. Instead, spuds are trucked from warehouses within a 15-mile radius.

3. By processing the potatoes at the source, only the finished product is shipped—not the additional 60 percent waste attributed to pebbles, dirt, defects, peels and trimmings.

Selecting the Potatoes

Trained buyers purchase U. S. No. 1 potatoes—Katahdins are preferred. When the field run of potatoes are bought, they are graded in a potato Bogg unit. Here, U. S. No. 1's are separated from "seconds" (small potatoes) as the potatoes travel along 2-in. mesh screens. The seconds pass through and are discarded. Meanwhile, the No. 1's travel over a wooden-roller conveyor—the inspection station—where all inferior potatoes are rejected. These include small potatoes that fail to fall through the screens as well as bruised, diseased, sunburned and windburned ones.

Small potatoes are discarded to enable the production department to manufacture more uniform size French fries and to increase the yield and production efficiency. Too many small potatoes had accounted for a large percent of small strips leaving the automatic cutting machine. These undersized pieces had to be rejected. Furthermore, small potatoes take longer to trim than large ones.

Now about the process: Operations are conducted in the receiving, processing, frying and packaging rooms—with the freezing done in the facilities maintained at the adjacent pea plant.

How They're Cleaned

Potatoes are trucked from nearby warehouses, 300 bags to the load. About 2,000 bags—enough for two days' production (two shifts)—are stacked in the receiving room. From these stacks, there is a steady flow of potatoes into the processing room. Bags holding 100 lb. are dumped into a 20 bag-capacity metal-lined hopper set below the floor of the receiving room. A drag conveyor feeds the destoner in the processing room, freeing the potatoes of string and some loose dirt during the travel.

There are nine operations that are carried out in the processing room. They include destoning, washing, pressure-steaming, peeling, trimming, slicing, separating, inspecting and blanching.

A long, narrow destoner, accomplishes two things: It removes pebbles and gives the tubers a preliminary wash as they are flumed through the unit in 3 in. of water.

From the destoner, the potatoes drop into a flood-type washer that removes most of the dirt. A chain conveyor with steel lugs pushes the spuds through the tank of circulating water. They get a 1½-min. wash before they are lifted onto a flight conveyor unit that elevates them onto a horizontal rubber belt for transfer to a 10 bag-capacity metal hopper prior to the next step.

Peeling and Trimming

Pressure-steaming of the potatoes to loosen the skins and to prevent discoloration before they reach the blancher is next. They are weighed into a scale hopper holding 320 lb. and dumped into a high pressure, steam-jacketed rotary pressure cooker. Here, the tubers are subjected to a controlled steam pressure for a predetermined length of time.

Subsequent step is the automatic peeling operation. From the cooker, the potatoes are dumped into a metal hopper, equipped with two sets of cold water sprays. A flight conveyor feeds the potatoes into a continuous peeler where 4 in.-dia. rotating rubber rollers spaced 2 in. apart and a series of water sprays remove most of the skins.

Peeled potatoes are now fed to the trimming table. Here, two rubber belts carry them along in front of operators who trim the sunburned, windburned and cut ones; remove eyes and other defects; and cut potatoes over 4½-in. thick in half, discarding those with hollow hearts. The trimmed potatoes are dropped on a center belt. Any that pass the operators untrimmed are loaded onto a return belt and repeat the trip on the two outside belts. The four belts on this table are made of rubber.

The peeled and trimmed potatoes on the center belt travel to a stainless steel bucket elevator that lifts them about 12 ft. onto a 20-ft. horizontal rubber belt. They are then fed into a 25 bag-capacity stainless steel hopper, filled with running cold water.

Preparing the French-Fry Cuts

A flight conveyor then delivers the potatoes to the cutting and slitting machines that form them into French-fry strips. The first step is to slice the potatoes into ½-in. pieces. Tubers drop into a 3-arm rotating impeller that forces them into 20 stationary knives, spaced ½-in. apart.

From this cutter, the slices fall on a rubber belt that carries them to two "kickers" (stainless steel, rubber-edged rollers) that flatten them into a single layer of slices. The first roller is set ¾ in. above the belt and the second ½ in. Final step is slitting the slices into ½-in. strips. This is done by a set of rotary knives, set ½ in. apart.

From the cutting and slitting machines, the strips are chuted to rotary-rod separators, where they are tumbled under pressure sprays. Most of the small pieces—those that pass through

rods set 3/8 in. apart—are removed by this action. Small pieces are flumed to the whipped-potato line, while the strips drop onto a wire-mesh conveyor, where operators give them a pre-blanch inspection. Any remaining small and broken pieces are dropped into flumes on each side of the belt and carried to the whipped-potato line. Here, too, defects and discolored pieces are discarded.

Controlling the Blanch

The potatoes are now ready for blanching. A flight-conveyor feeds the strips into a continuous circular drum blancher.

Control of the operation of the blancher is the key to the production of uniformly browned French fries during the frying stage. To maintain this uniformity, the control laboratory conducts fry tests on all lots of potatoes before they are processed. From these tests, the laboratory determines the sugar content and what blanching time and temperature must be used.

For example, if one lot fries too brown, the blanching temperature can be raised. This step lightens the color after the potatoes are fried. If, on the other hand, a lot of potatoes test-fries too light, they are blended with potatoes containing a higher sugar content.

Two-Stage Frying

Next step is frying. Blanched potatoes fall on a wire-mesh conveyor that elevates them about 10 ft. and carries them into the frying room. Here they go through two frying stages—a preliminary and a final fry.

As the strips are chuted to two preliminary continuous oil-heated friers, they pass over a vibrator that scatters them so that they can be evenly fed into the stainless steel, perforated frying baskets. The friers are 25 ft. long and 3¼ ft. wide, and they are housed in stainless steel sections to confine the heat and smoke and to minimize fire hazards. Base section of the friers is constructed of fire-brick.

Frying baskets mounted on an endless chain travel through a layer of hot fat. There is just enough fat to keep the French-fry cuts completely submerged. The frying time varies, depending upon color and texture tests. Slices are fried enough to brown them lightly and cook out about 20 percent of the moisture.

Once through the preliminary friers, a stainless steel wire-mesh conveyor with slats elevates the French fries and feeds them to the final frier. This unit is identical to the preliminary friers and it handles their output.

French fries get this second fry in order to even up the color, particularly those white areas caused by crossing of strips in the preliminary units.

How Oil Is Supplied

Oil is handled in this manner: Drums of hydrogenated vegetable oil are dumped into a 6 bbl.-capacity melting tank, equipped with steam coils. Melted oil is then pumped to the friers.

The oil is circulated in each frier to keep the temperature uniform. Oil is pumped from one end of each unit through steam-heated pipes to the other end. The same centrifugal pump delivers the oil at 2-hr. intervals to continuous centrifuges for clarification.

Quick cooling follows the frying. The strips leave the final frier and drop onto a wire-mesh conveyor. A vibrator drains off excess oil and distributes the potatoes evenly on another mesh belt that carries them through a 50-ft. cooler. An exhaust fan pulls cold air from outside the plant through filters and into the cooling tunnel.

French fries are cooled to 45-55 deg. F. to reduce breakage of the potato strips during weighing and filling.

Packaging Mechanized

From the cooler, the fries are carried back through the processing room, where they get a final inspection and then continue to the packaging department. Here, they are chuted over a vibrator that scatters and feeds them to four filling machines.

Two carton-forming machines furnish cellophane-lined waxed cartons to the automatic fillers. Built into each filler is a scale to enable the operator to check-weigh each carton.

The cartons are now ready for wrapping and freezing. They leave the filler in four lanes and converge at a point where they are delivered single file to a carton-closing machine. Next, the cartons are machine-wrapped and heat sealed in waxed paper. Then, they are conveyed through a tunnel to the facilities in the pea plant where they are frozen and cased—24 packages to a container.

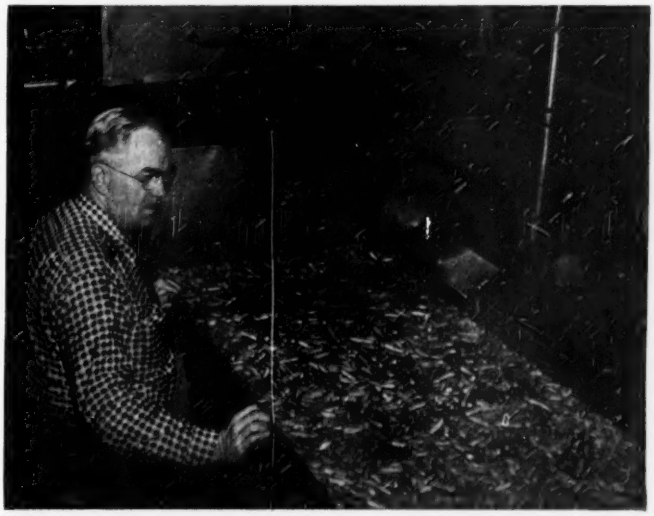
Samples of the finished product are finally inspected by the control laboratory for net weight, color, texture and defects.

The Whipped-Potato Line

Now for the frozen whipped-potato operation: Thin, broken and small pieces of potatoes that are flumed from the reel separators and pre-blanch inspection belt are transferred to a wire-mesh conveyor. They are then carried through a continuous steam blancher. Headers above and below the conveyor feed steam to unit's eight lines.

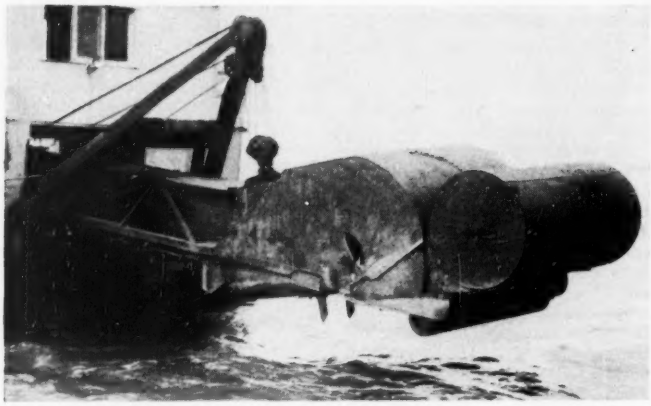
Emerging from the blancher, the potatoes pass to an inspection belt, where defective pieces are discarded. A 1 ft.-wide rubber belt conveys the potatoes to a pulper, where they are riced. The potatoes then fall into a portable bowl, which is rolled under the beaters, and the potatoes are then whipped to the proper consistency. Finally, the whipped potatoes are hand-filled into cartons, weighed, closed, machine-wrapped with heat-sealable waxed paper, and frozen.

Fries Every One an Even, Golden Brown

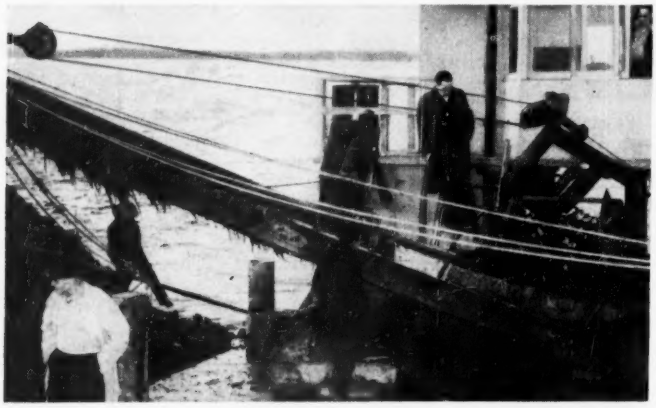


STRIPS emerge from final fryer, uniformly browned. They are vibrated (right foreground) to remove excess fat before going into cooling tunnel.

Brings Them Up



DREDGE CHAMBER, seen here in elevated position, rests in mud when lowered, closing in sides. Jet propellers then draw oysters from beds.



DUMPING END of operation is seen above. Oysters are dropped (right) from lifting to loading belt that conveys them to barge alongside (left).

Oysters *Pumped* From Beds

Hydraulic jet deposits bivalves on 3-ft.-wide chain belt held just above the mud. Then belt carries them up to surface for transfer to barge

RAY BLOOMBERG
"Food Industries" Correspondent, Seattle

A new-type hydraulic dredge now harvests oysters more efficiently and with less damage than the conventional drag dredge. Operated by the Willapoint Oyster Co. of Seattle, the apparatus has been "proved out" in the Willapa Harbor area of southwest Washington state.

The dredge is activated by a low-pressure (5 lb.) hydraulic jet that picks up the oysters in a mixture of mud and water and deposits them on a submerged 3-ft.-wide chain belt positioned just above the mud. The belt travels upward at 80 ft. per minute on an incline up to 18 percent. Oysters under 1 in. in size drop through the chain, along with the mud.

The hydraulic jet is produced by two propellers driven by a 143-hp. motor, which also runs the conveyor. The blades propel 20,000 gal. of water a minute through a flat nozzle 7 ft. wide and 4 in. deep at the outlet. The nozzle is held about 4 in. from the bottom in such a position that the stream of water strikes the mud at a 30-deg. angle. A series of rods connecting the dredge mechanism to the vessel keeps this angle constant, despite depth variations of 6 to 20 ft.

The dredge chamber is sealed from the outside water by a roller at the rear, mud at the sides, and the stream of water at the front. Weight is reduced in the water by buoyancy tanks controlled by compressed air from the vessel.

From the chain belt, the oysters fall onto a loading belt that extends to an adjacent barge. Three 3,000-bu. scows are required to receive the oysters when the barge is in full operation.

In harvesting operations, pilings are driven at four points around the bed and about 1,000 ft. apart. The dredge, held to a piling by a line, then begins to circle, beginning at about a 50 ft. radius from the piling, and moving at 2 mph. As each circle is completed, the line is let out 6 ft. and a new, wider circle is begun. This operation is continued until the area around the piling has been dredged completely for a distance of 500 to 600 ft. The dredge then moves to another piling.

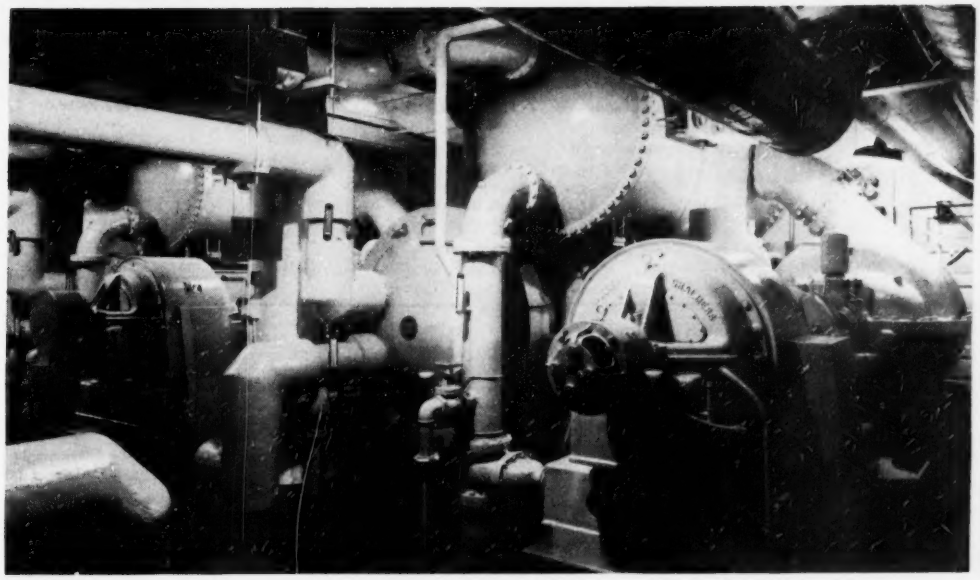
Covering 60,000 sq. ft. (approximately 1½ acres) an hour, the dredge picks up as much as 1,000 bu. to the acre, four times the return from a drag dredge and 50 times that of a single busheler.

The dredge requires a crew of three —captain and two deckhands. The vessel is 24 x 67 x 6¾ ft. with a draft of 5½ ft., and it is powered by two 143-hp. engines.

It is termed equally valuable in harvesting rich or poor beds, and it has been found particularly well suited for reclaiming year-old oysters for transplanting on fattening grounds. In such transplanting operations, speed and care in handling are the important factors, and the hydraulic dredge is reported to be better than the drag dredge on both counts.

In 4 or 5 hr. time, it will harvest some 7,000 bu. of these young oysters at one end of Willapa Harbor. Transferred to a scow, these bivalves are then taken to the fattening grounds—either the grounds directly across the bay or those in nearby Gray's Harbor. In no case are the oysters out of the water more than 24 hr.

When the dredge is harvesting for market, the loaded scows are towed to South Bend, a trip ranging from 5 to 25 mi., depending on the point of harvest.



HERE are two centrifugal water-cooling compressors typical of units used when plant output is large.

How To Get Better Bakery Refrigeration

Proper installation and operation of modern cooling and air conditioning units assure the precise processing control that spells quality baked goods

TYLER G. HICKS
Mechanical Engineer, Summit, N. Y.

In the modern bakery, refrigeration and air-conditioning are vital components of production. Correctly installed and operated, they enable the manufacture of more uniform quality products at lower costs, through the better control effected in processing.

In the design and construction of modern bakeries, the food specialist must work closely with the mechanical engineer, since the necessary food and engineering skills are seldom prossessed by one man. This is especially true when selecting refrigeration equipment.

The engineer, having a general idea of baking operation and machinery, needs the advice and experience of the food specialist before he can choose the proper refrigerating machinery. Likewise, the food specialist must rely on an engineer for advice concerning the most economical equipment for his plant.

Hence, a general statement of the requirements of bakery refrigeration from both food and engineering standpoints is of value to all concerned.

Five Problems Encountered

Close time schedules, small margins of profit, rigid cleanliness requirements, and moderately accurate control of temperature and humidity make bakery refrigeration requirements unique. In the usual bakery, five important problems are encountered that concern refrigeration (direct cooling or air conditioning): (1) Cold-storage of flour, milk, yeast, waxed paper, and shortening, (2) dough mixing, (3) fermentation, (4) make-up, and (5) proofing.

To date there has not been any national standardization of baking plant design. Local conditions and amount of capital available appear to have a greater influence on plant design than any other factors.

Although designs have not been standardized, baking experience has shown that there are certain desirable conditions which should be maintained to assure good product quality. Flour stored at 78 deg. F. and 75 percent relative humidity will retain its proper moisture content—13 percent—for the usual maturing or ageing period. Malt, yeast, milk, and shortening stored at 40 deg. F. do not spoil; a 50 to 60 deg. F. storage temperature is satisfactory for waxed paper.

Heat generated in dough during mixing will cause burning unless the mixer bowl is cooled by water at 33 to 38 deg. F., chilled air, or brine. Crushed ice can be used in mixers of small bakeries (20,000 or less loaves per week), but chilled water, air, or brine is preferred for large plants. In any case, finished mix temperature should not exceed 80 deg. F.

Refrigeration for make-up rooms and fermentation areas is used in air conditioning systems, which maintain desired conditions in these spaces. Studies have shown that it is possible to save from 0.5 to 0.7 percent, or more, on bread and cake making costs when these areas are air conditioned.

Fermentation room temperatures between 78 and 80 deg. F., with a 75 percent relative humidity, assure proper quality products. Improper temperatures and humidities lead to crust-

Shortcut Data for Determining Right Size of Equipment

TABLE I—JACKET and Ingredient Water Pump Capacities

Mixer Capacity (Lb. of Dough Per Batch)	Jacket (Gal. Per Min.)	Ingredient (Gal. Per Min.)
350	7.5	10
500	10	12.5
650	12.5	15
700	15	20
850	20	25
1,000	20	25
1,100	20	30
1,200	25	30
1,300	25	40
1,400	30	40
1,700	30	40

TABLE II—PROPERTIES of Calcium Chloride Brine

Parts of $CaCl_2$ by Wt. in 100 Parts of Solution	Specific Gravity (At 60 Deg. F.)	Weight (Lb./Gal.)	Freezing Temp. (Deg. F.)	Specific Heat		
				−4 Deg. F.	32 Deg. F.	50 Deg. F.
6	1.050	8.76	28.0	....	....	....
8	1.069	8.926	24.2	....	.882	.887
10	1.087	9.076	21.4	....	.853	.858
12	1.105	9.227	18.2	....	.825	.831
14	1.124	9.377	14.4	....	.799	.805
16	1.143	9.536	9.9	....	.775	.781
18	1.162	9.703	4.7	....	.752	.759
20	1.182	9.853	− 1.0	....	.731	.738
22	1.202	10.04	− 7.3	.695	.711	.718
24	1.223	10.21	−14.1	.678	.693	.700

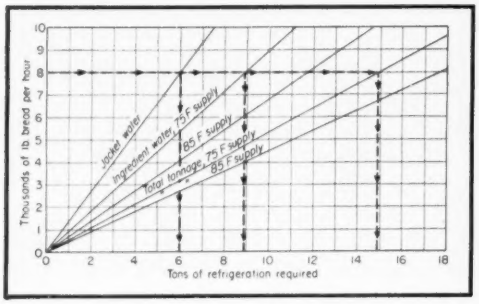

Thousands of lb bread per hour
Tons of refrigeration required
Jacket water
Ingredient water, 75 F supply
Total tonnage 75 F supply
85 F supply
85 F supply

FIG. 1. Arrowed lines show typical solution for figuring refrigeration tonnages for cooling water.

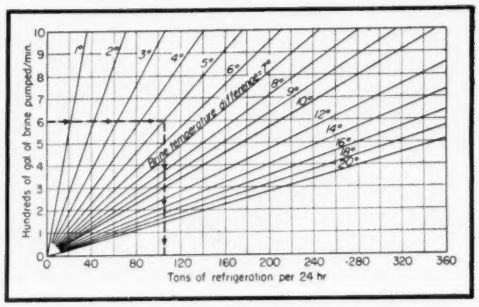


FIG. 2. Refrigeration tonnage via brine is calculated from this chart. Arrows show typical solution.

ing of sponges and straight doughs, together with streaks and large lumps in the finished products. Humidities between 60 and 70 percent at a divider temperature of 80 deg. F. are necessary in the make-up department. Many older bakeries are not fitted with air conditioning systems in the make-up area, and hence product quality suffers.

Proofing and cooling require rather high humidities, which can be obtained by proper application of refrigeration equipment to air conditioning systems. A 90 deg. F. temperature and 85 percent relative humidity are usually suitable for proofing. Cooling for 80 to 120 min. in a 65 percent relative humidity with a temperature between 70 to 75 deg. F. will prevent loss of product weight.

Capacity Determines System

Refrigeration systems installed in bakeries vary in arrangement according to plant capacity. Present practice in moderate-size bakeries uses one small refrigerating machine for the ingredient room and yeast box. Another machine cools ingredient, jacket, and fermentation room water. Two machines are commonly used because ingredient room and yeast have to be held at a temperature of 40 to 45 deg. F., 24 hr. a day, whereas water cooling facilities are operated only during mixing and fermentation periods. Occasionally, however, one machine will be used for all necessary cooling. Use of a single machine may complicate controls and increase operating costs if the unit is not carefully chosen and properly installed.

Separate cooling tanks for ingredient and jacket water are more common than a single tank. Use of two tanks generally stems from the baker's preference. Single tank systems are simpler and less expensive. All modern water cooling tanks are thermostatically controlled and readily accessible for maintenance and cleaning.

Problem Shows Factors

Refrigerating equipment for ingredient and jacket water cooling is usually selected on the basis of food and engineering data. Which factors must be considered are shown by the following typical problem:

A bakery will produce 3,600 lb. of bread per hour. Four mixes, 900 lb. each, will be used. The bread is 65 percent flour; water is supplied from city mains at 75 deg. F.; sponge should be figured as 60 percent of batch; specific heat of flour equals 0.42; and sponge enters at 90 and leaves at 74 deg. F.

Problem: Determine the refrigeration tonnage required for sponge ingredient, dough ingredient, and jacket water cooling. The computation follows, treating the three water streams individually.

(1) Sponge Ingredient Water:

Weight of flour per batch = (900) (0.65) = 585 lb.
Weight of sponge per batch = (585) (0.60) = 351 lb.
Weight of water per batch = (351) (0.65) = 228 lb.
Mix will be handled according to the flowing assumed data (approximate values, hence check with your manufacturer before using in final calculations):

Power for handling flour, 4 bhp. sponge agitation, 6 min.; 5 bhp. sponge breaking, 4 min.; 8 bhp dough agitation, 10 min.; heat absorption, sponge 65 percent, flour 62 percent. Flour supplied to mixer at 90 deg. F. Minimum chilled-water temperature, 38 deg. F. Then—

$$\text{Agitator heat} = \frac{(\text{Mix time, min.})\ (2545)\ (\text{bhp.})\ (\text{wt of flour, lb.})}{60\ (\text{wt. of flour, lb./bbl.})}$$

$$\text{or, agitator heat} = \frac{(6)\ (2545)\ (4)\ (35)}{60\ (200)} = 1{,}790 \text{ Btu.}$$

Temperature drop of sponge = 90 F. − 74 F. = 16 F.
Since specific heat of flour is 0.42,
flour heat = 351 (16) (0.42) = 2,360 Btu.
With 6.5 Btu./lb. heat of absorption for the flour, absorption heat = 351 (6.5) = 2,280 Btu.
Hence, total heat = 6,430 Btu.

$$\text{Water temperature rise} = \frac{\text{heat removed}}{\text{lb. of water used}}$$

$$= \frac{6{,}430}{228} = 28 \text{ F., closely.}$$

Cooling water temperature needed = sponge temp. (74 F.) − water temp. rise (28 F.) = 46 F.
Then sponge ingredient water refrigeration capacity =

$$\frac{(\text{lb. of water/batch})\ (\text{water temp. drop, F.})\ (\text{number of mixes})}{12{,}000\ \text{Btu./hr./ton of refrigeration}}$$

$$= \frac{(228)\ (75\text{–}46)\ (4)}{12{,}000} = 2.2 \text{ tons}$$

(2) Dough Ingredient Water:

$$\text{Agitator heat} = \frac{(4)\ (2545)\ (5)\ (351)}{60\ (200)} = 1{,}490 \text{ Btu.}$$

Weight of flour added is 585 − 351 = 234 lb.
Weight of water added is (234) (0.62) = 145 lb.
Agitator heat during mixing =

$$\frac{(10)\ (2545)\ (8)\ (585)}{60\ (200)} = 9{,}940 \text{ Btu.}$$

Absorption heat = 234 (6.5) = 1,520 Btu.
Assuming dough out at 80 F., drop = 90 F. − 80 F. = 10 F.

Flour heat = 234 (10) (0.42) = 985 Btu.
Hence, total heat = 13,935 Btu.
Ingredient water = 145 (80 F. − 40 F.) = 5,800 Btu.
Heat to be removed by jacket water = 8,135 Btu.
Then, ingredient water refrigeration capacity =

$$\frac{(145)\ (75-38)\ (4)}{12{,}000} = 1.79 \text{ tons}$$

(3) Jacket Water Tonnage:

Using the heat removed by the jacket water,

$$\frac{(8{,}135)\ (4 \text{ mixes})}{12{,}000} = 2.72 \text{ tons}$$

Therefore, tonnage required = 2.2 + 1.79 + 2.72 = 6.71 tons.

Although these calculations are based on chilled water, a similar procedure is also suitable for systems using brine for cooling.

Curves Speed Calculations

Where tonnage calculations are frequently necessary, the curves in Fig. 1 will save much time. These are based on the assumed data given under "(1) Sponge Ingredient Water," and they are sufficiently accurate for all usual bakery design problems. Note that the tonnage for ingredient water plotted is the sum of sponge and dough ingredient tonnages.

In the foregoing problem, the heat to be removed by the jacket water, when bakery capacity is 3,600 lb. of bread per hour, is 8,135 Btu. This means that with a 4 min. sponge agitation and a 10 min. mix, the heat to be removed is:

$$\frac{8{,}135}{14} = 580 \text{ Btu. per min. closely.}$$

With a 4 deg. F. temperature rise in jacket water and 8.33 lb. per gal. of water, quantity of cooling water required is

$$\frac{580}{4\ (8.33)} = 17.4 \text{ gal. per min.}$$

To supply this quantity, a 20 gpm. pump would be selected. Instead of making these calculations, our accompanying Table I can be used. From it, the capacity of jacket and ingredient water pumps is readily determined.

Water for mixer cooling seldom need be treated for removal of scale-forming constituents. When obtained from lakes or rivers, it is common practice to filter the water before it passes through the mixer jacket. Ingredient water must, of course, be pure and at the correct temperature for dough-making.

Ingredient water cooling tank capacity is usually made at least three times the hourly water consumption. For our assumed bakery, ingredient water consumption is (228 + 145) (4 mixes) equals 1,492 lb. /hr., or 24 cu. ft. per hr. Hence, a tank of at least 3(24) equals 72 cu. ft. capacity would be selected. Where sufficient room is available, the ingredient water cooling tank might be made large enough to cool the jacket and fermentation room water also. Arrangements vary from one bakery to another but the aim of all installations is low first cost together with good operating economy.

Proper temperature and humidity conditions are of prime importance in fermentation rooms. Temperatures below 80 deg. F. reduce yeast cell development; higher temperature accelerates development and may lead to wild yeast spores. Proper relative humidity, in the 75 percent range, prevents absorption and release of moisture by the dough. High relative humidities cause slimy dough and stickiness. Crusting of the dough, prevention of gas release, blow holes, and lumps are caused by low humidities. Thus, it can be seen that product quality and bakery income are directly affected by temperature and humidity conditions prevailing in fermentation rooms.

Air supplied to fermentation rooms must be distributed in such a manner that drafts, cold spots, and overheated areas are eliminated. Various methods for obtaining even distribution are available. The best distribution method for a given plant depends on many factors and can be selected only after a complete study of manufacturing conditions. Regardless of distribution method. the fermentation room air conditioning system should provide between eight and twelve air changes per hour.

■ "Greater consumer satisfaction, happier manufacturing personnel, and increased profits are the results of proper bakery manufacturing control. Therefore, it is important that the food specialist and engineer work closely during design, construction, and operation of the bakery. Since any savings in plant operating costs are effective over a period of many years, the time and effort spent in planning is well worthwhile."—The Author

How Tonnage Is Figured

Refrigeration for fermentation rooms cools the air which is drawn from outside the bakery and that which is recirculated from the room. The following typical problem will show how refrigeration tonnage is determined:

Heat gain calculations show that 3,150 cu. ft. per min. of air are required to maintain a 75 percent humidity and an 80 deg. F. dry bulb temperature in the fermentation room of a bakery.

Problem: Determine the refrigeration required if 300 cfm. of outside air and 2,850 cfm. of recirculated air is used in the air conditioning apparatus.

Heat removed from the outside air is 7.5 Btu. per lb., from the inside air, 2.8 Btu. per lb. Air specific volume is taken as 13.5 cu. ft. per lb.

Refrigerating capacity in tons for an air cooling unit is:

$$\text{Tons capacity} = \frac{(0.005)\ (\text{cfm.})\ (\text{Heat removed, Btu./lb. air})}{\text{Specific volume of air cu. ft./lb.}}$$

For the recirculated air,

$$\text{Tons capacity} = \frac{0.005\ (2{,}850)\ (2.8)}{13.5} = 2.96$$

For the outside air,

$$\text{Tons capacity} = \frac{0.005\ (300)\ (7.5)}{13.5} = 0.834$$

Hence, total refrigeration for air cooling = 2.96 + 0.834 = 3.79 tons.

However, water is used to cool this air. As stated earlier, water is supplied at 75 deg. F. and is cooled to 38 deg. F. Assuming that the water temperature rises 30 deg. F. in the air cooling equipment, the quantity required in gallons per minutes is:

$$\text{Gpm.} = \frac{(24)\ (\text{Tons capacity for air cooling})}{\text{temperature rise, deg. F.}}$$

or Gpm. = 24 (3.79) = 3.03, say 3.1 gpm.

Then,

$$\text{Water cooling tonnage} = \frac{8.33\ (\text{gpm.})\ (\text{water temp. reduction, deg. F.})}{200}$$

$$= \frac{8.33\ (3.1)\ (75-38)}{200} = 4.76 \text{ tons}$$

Fermentation room water can be cooled either in a separate tank or in a tank with the ingredient and jacket water. Choice of the arrangement is determined by the amount of water required for each service, space available in the bakery, and initial costs. Separation of the water systems prevents any possible ingredient water contamination that might result from dirt entering the air conditioning piping.

Brines Used In Cooling

Many of the more recently constructed bakeries use brine for various cooling operations. Three kinds of brine have found use in refrigerating systems—magnesium chloride, calcium chloride, and sodium chloride.

Calcium chloride is most common because it has the lowest freezing point and is least corrosive. Strong brines are to be avoided because they may cause clogging of the pipes and equipment when salt deposits out. Weak brines will freeze around the expansion coil and reduce heat transfer rates. Best practice calls for using a brine that will freeze at not less than 10 deg. F. below the lowest temperature prevailing during plant operation. To avoid instability, brine specific gravity should range between 1.240 and 1.250.

For quick calculations of brine refrigerating capacity, our accompanying Fig. 2 graph can be used. By entering at the left with the gallons per minute of brine circulated and running across horizontally to the temperature difference of the brine, refrigerating capacity can be found on the lower scale. Properties of calcium chloride brine are summarized in Table II.

SIDE-DOOR FLEET has stepped up distribution of White Rock products in heavily congested areas.

CLOSED compartments protect beverages and bottles from weather damage, while top may be used for fair-day deliveries or for empties in any weather.

Built For Fast Deliveries

Curbside unloading is speeded by newly designed side-door trucks that provide ample space for the return haul of cased empty bottles

ECONOMICAL because of easy side loading and unloading, a newly designed fleet of seventy Dodge trucks was recently put into service in New York City by the White Rock Corp. In addition, closure—by sliding doors—prevents pilferage, also protects the bottles from the weather.

The new type truck is used exclusively for deliveries to retail outlets other than distributors. The unit consists of a Dodge Model J-170 chassis of 2-ton rated capacity and a four-tier body approximately 16 ft. long, 8 ft. wide, and 4½ ft. high above the chassis.

The body is made entirely of steel. Its three top tiers are divided into compartments, closed in on both sides of the truck by the aforementioned sliding-type doors. Each tier is divided into three compartments, making possible transverse bulkheads, which add strength and rigidity to the body.

Compartment doors are formed from special quality steel and are protected by patent. Each door has an equalizing spring action on stop pins that run on door guides. When the door in its vertical closed position is lifted, the spring pulls it out of sight into a horizontal position inside the compartment at the top. And when the door is pulled out, the spring action combined with the stop pins closes the door in its normal vertical position.

Loaded From Pallets

At the White Rock plant, cases of twelve 1-qt. bottles of White Rock sparkling water, pale dry ginger ale, or fruit beverages are loaded by hand into the compartments from each side of the truck. The cases are moved to the truck side from the storage area on pallets carried on gasoline-driven industrial fork trucks. At night, the empty cases and any bring-backs are unloaded and handled in the reverse manner.

There are eleven compartments in all, including three on each of the top three tiers. These latter extend clear across the chassis with doors on both sides. The remaining two compartments, without doors, are located one on either side at the bottom of the body along the line of the running-board.

Cases are loaded four wide across the body in all of the compartments, except the two lower ones, which are only one case wide. Each of the six compartments on the two highest tiers holds 16 cases, four across and four lengthwise of the body. Because of the cutout for the rear wheel housing, only three compartments (four cases wide and three cases long, to accommodate twelve cases each) are possible on the third tier from the top. The two bottom compartments hold five cases each—one case wide and five long.

Thus, the inside capacity of the body is 142 cases, 48 on either of the two highest tiers, 36 on the third tier, and 10 cases in the two bottom compartments. In addition, 40 more cases, arranged in four cases across the body and ten long, may be loaded on the top of the body to give a total capacity of 182 full cases.

Each full bottle case weighs 53 lb., so that the payload weight is 9,646 lb.,

or approximately 4.8 tons. Cases of empty bottles weigh 29 lb. each, and as many as 150 empty cases can be carried on the top of the body in addition to the 142 cases inside.

Each of the White Rock products carries distinctive paper labels on the bottles. Protection of these labels is assured by use of the patented, sliding-door closures on both ends of the compartments. There is no risk of the labels being washed off by rain or snow while out on the delivery route.

The trucks are operated by a two-man team of driver and helper to speed deliveries. The whole job is expedited by division of the tasks of taking in the full cases, getting out the empties, having the delivery ticket signed, and collecting cash for the order.

Compartment doors also prevent the wind from sweeping through the tiers from one side of the truck to the other, and this helps to keep the bottles from freezing and cracking on cold weather deliveries. The doors permit deliveries of bottles at temperatures as low as 0 deg. without risk of the product freezing.

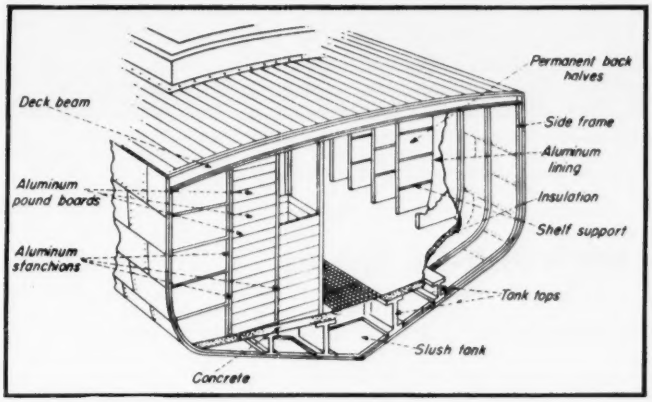
White Rock places great importance on the appearance and cleanliness of its trucks, believing that these vehicles have a great advertising and sales value. Accordingly, the corporation spent much time and effort in arriving at what it considers the best-possible truck painting and lettering layout.

First of all, a two-color scheme was decided upon. The top of the motor hood, the upper half of the cab, and the upper half of the body were painted a cream color, designated as Croydon cream. And the fenders and lower half of the cab and body display an "Export" blue color.

The corporation's trademark—the winged Psyche at the spring—occupies the position of prominence in the center panel of the upper half of the body on either side of the truck. Psyche and her spring are shown, in their natural colors, by the use of a decalcomania.

Flanking Psyche are the trademark words "White" and "Rock" in a contrasting red, designated as Norfolk red. The remaining lettering is white on the blue background. All the lettering is done with Meyercord decals.

The bodies were built jointly by Remke Trailer Co., Detroit, Mich., and Hesse Carriage Co., Kansas City, Mo.



SECTION through trawler shows ingenious construction of holds.

EASY IN, easy out paneling.

Aluminum Holds Protect Fish

Provide better refrigeration and more sanitary conditions. Also increase boat capacity, speed

H. C. PLUMMER
Montreal, Quebec

Aluminum alloy lining, stanchions, shelves and "pound-boards" are now being used in the holds of trawlers. And operators of the fishing craft attest to the advantages of light weight, resistance to corrosion, ease of cleaning and fast cooling properties of the aluminum. They also report greater carrying capacity and higher speeds for the trawlers.

This development succeeded after several years of experimentation by four groups: The Atlantic Fisheries Experimental Station (Canadian Department of Fisheries), the Fishing Industry Research Institute in Emporia, S.A., English fishing interests, and one of the largest trawler operators in Iceland.

The new type vessel is compartmented and completely lined with aluminum. The lining material is ⅛-in. Alcan 57-S sheets. Usual installation allows no air space between the insulation and hull, although sometimes refrigerated air is circulated.

Pound-boards, shelves and fish-room stanchions are 51-ST aluminum extrusions. Compartment sides, ends and ceiling are all fitted with removable and insulation-backed aluminum panels. One type trawler employs a 2- to 3-in. thickness of sponge plastic insulation to cover both sides of the pound-boards.

Since the aluminum weighs one-third as much as steel of the same thickness and does not absorb moisture or odors as does wood, it is highly suitable for fish-hold lining. In the wood holds of older trawlers, where alternating layers of fish and ice were placed, the wood could not be cooled easily, and it raised the temperature of the fish. But now ice cools the aluminum, and the latter conducts heat away from the fish. Wood, being porous, also picked up bacteria from fish slime and contaminated the cargo.

The readily removed pound-boards and shelving mean easier cleaning and replacement, which makes for shorter loading time and higher quality fish at the end of a long voyage.

"POUR ONE!" is the word as this employee takes a "breather" at Pasco Packing Co.'s Dade City, Fla., citrus canning plant. Company operates two such snack bars. Women workers on piece basis are free to stop for a bite whenever they wish, while personnel on "time" can visit counter during their special relief periods.

Food Firms Set Pace With Pick-Up Snacks

National check-up indicates they have taken lead in providing workers with between-meal refreshments. Output seen boosted, accidents lowered

ON-THE-JOB SNACKS for plant workers are becoming the rule rather than the exception, according to recent surveys. Big reason for the snack is improved labor relations. But there are those who contend that the between-meal refreshers make for increased production and lower accident rates.

Of 814 companies replying to a survey conducted by the National Office Management Assn., 609 firms reported they permitted employees to obtain between-meal refreshments. And many companies that answered "No" went on to confess that they "winked" at the rules.

Most inclined to allow snacks were food manufacturing, communications, banking and financial firms; least inclined were transportation and public utility companies.

■ **The check-up on food plants—60 were covered—indicated that food firms lead the rest in providing company lunchrooms and free refreshments.**

The Field Research Div. of the Paper Cup & Container Institute ran a similar survey of 29 plants employing fewer than 1,000 persons. Of these, 15 reported provision for morning and afternoon snacks. Also, 34 of 69 offices queried in a further study reported the custom of mid-morning coffee.

Food plant executives are cautious in assessing the immediate effect of these mid-morning and mid-afternoon breaks. E. F. Gill, manager of the Personnel Compensation & Research Div. of General Foods, writes, "To the extent that mid-morning coffee reduces fatigue, it probably results in less careless acts and may, indeed, promote increased production."

On the other hand, there are also dissenting views, Albert L. Walters, Hunt Foods, Inc., says: "At times the breaks may hold up production. I couldn't say they ever increased it. Most of the time on day shifts, the lost time cuts down production."

The surveys also reported on methods used for providing snacks. Take-out of paper containers from the company cafeteria or a nearby restaurant is popular. Another means has coffee carts carrying thermos jugs circulating among the workers. Also, automatic vending machines, for hot coffee as well as other foods and drinks, are getting increased attention.

Finally, a few specific instances: Borden's Farm Products Co. of Michigan has installed a hot coffee dispensing unit; The Kellogg Co., Battle Creek, Mich., operates a soda fountain and snack bar separate from its regular cafeteria; Post Cereals, also of Battle Creek, has set up subsidiary lunchrooms handy to the various working areas; and Pasco Packing Co., Dade City, Fla, runs two canteens for odd-hour eating.

We Think . . .

■ Better Beat Surplus Food Propagandists to Punch

Because of the smelly surplus food situation, you are likely to see a large crop of unhappy suggestions for increasing the consumption of everything from dried milk and eggs to potatoes. Well-meaning nutritionists even get involved, and writers for newspapers and popular magazines find food for inspired, if thoughtless, writing.

Pressure will continue for bakers to put more dried milk into bread. And it has even been suggested that a campaign is needed to increase the consumption of potatoes—this at the expense of fresh vegetables, which nutritionists have extolled these many years.

All of us, of course, would like to see per capita food consumption increased, especially as it has slumped 3 percent since 1947. But we think propaganda for one product at the expense of another can do the food processing industry a lot of harm by confusing or misleading the public. It can, and often does, harm the industry or the product propagandized because it backfires. And we hasten to explain that legitimate advertising and promotion claims are not considered here as propaganda.

With this situation developing, food processors and associations should see that the public—and those who write and edit food articles for general publications—are correctly informed about the values of their products.

American Institute of Baking did an excellent job of rebutting the unfortunate statements made in the article, "Bread, and the Stuff We Eat," in a recent issue of *Harper's Magazine*. This rebuttal effectively took the article apart, paragraph by paragraph—all 44 of them. And if you are a baker you ought to get a copy, because of the effective advertising and promotional material which it contains.

As in the mad-dog-flour case, however, the counter arguments may never catch up with the unfounded statements. So it is better to get there first with the facts.

■ You Can Blame Washington for Shortage of Cellophane

Industry cannot buy all the cellophane it wants, and certain other packaging films are subject to allocation. This stems from the mistaken philosophy of the Department of Justice. It just can't believe that any big company can be a good company—nor that anybody who makes money is quite honest.

Ever since Tom Clark was Attorney General, the hostility of Justice toward large and profitable business has had a deterring effect on the only manufacturers of regenerated cellulose films—American Viscose and du Pont. In particular, du Pont has been singled out for antitrust action. As a result, that company has frozen its cellophane expansion program.

Even though demand for transparent packaging materials has now outstripped productivity, neither of the cellophane producers is likely to risk another dollar in a venture that may result in antitrust litigation.

Some would-be cellophane purchasers are turning to cellulose acetate—if they can get it. The acetate demand is now so great that this, too, is on allocation.

The only hope for those who need these particular packaging films seems to be the completion of the new cellophane plant of Olin Industries, some months or years hence. The story behind the Olin matter is all a part of the Department of Justice hostility to large, efficient industry. To tell it all here is impossible in the space available. But it does not make sense that a firm has to set up another competitor in business.

Trade gossip has it that by the time the new Olin plant gets into production its entire output will be sold!

Underlying the whole series of episodes is Washington's failure to comprehend that research—plus management that knows how to plan and use the research tool—is the basis of the success that now incurs official displeasure. American scientists know how to conduct good research, but there are too few managements that know how to use it to make profits. And the official attitude seems to be to put the brakes on the few that have this outstanding ability.

Meanwhile, shortage of certain transparent packaging films continues to grow.

■ Non-Owned Return Loads Can Cut Food Trucking Costs

"What law is this," asks a food processor, "which prevents a company from carrying another firm's goods in its privately owned trucks? That's discrimination of the worst kind. Besides, it increases our cost of food distribution when we do not haul a full return load."

The law which prevents a private carrier from hauling other people's goods, except under certain conditions, is the Motor Carrier Act of 1935, administered by the Interstate Commerce Commission for interstate movements. And similar acts have been passed by most of the individual states to cover intrastate hauling.

The original Federal Motor Carrier Act was passed in the public interest to eliminate the chaos which then existed in the for-hire motor transport business.

It provided that all for-hire carriers must obtain certificates of convenience and necessity, must operate equipment meeting certain safety requirements, and must carry cargo insurance to pay shippers' claims for lost or damaged goods. It also specified that drivers must not work more than 10 hours in any one day without an intervening rest period of 8 hours, or work more than 60 hours in any one week.

The act further divided the for-hire carriers into two classes, contract carriers and common carriers. The former operate on bilateral agreements between themselves and certain specified shippers. The latter hold themselves open to haul for any shipper certain items over certain routes at certain rates.

The Motor Carrier Act says nothing about, and has no jurisdiction over, private trucks delivering the goods of the owner. But once the private carrier hauls other people's goods for pay, he loses his private carrier status.

The food processor, of course, has the right to apply

for a certificate of convenience and necessity as a contract or common carrier. But unless the rights asked for cover a route lightly traversed, or one between off-route cities, the granting of a certificate would take a long time.

One other course is open to the food processor. That is to lease his equipment to a common carrier traversing the return route to be covered. In such a case the processor's own goods and that of the other shipper making up the full return load would be billed by the common carrier at the latter's published rates.

So the food processor's profit or saving on the deal would be his leasing income, minus the cost of operating the equipment and the amount paid to the common carrier for his share of the load.

▪ Others Should Take a Leaf From Tom Rector's Book

With the death of Tom Rector by heart attack on March 31, another pioneer food technologist has gone—prematurely, for he was only 56. Every food technologist knew of Tom Rector, the man who coined the expression:

"Well-managed research is the only legitimate activity that pays off like a racket."

His life should be an inspiration to all, for he demonstrated that a man can go to the top without the benefit of a formal technical education. Without the formalities, he was as well informed as the possessor of many academic degrees.

At the age of 18 he became interested in foods, but in 1912 there were no university courses in what we now know as food technology. The effect of the Food & Drug Law of 1907-8 was then barely noticeable in the development of food analysis. In the Institute of Industrial Research of Washington, D. C., where he held his first important job, he analyzed every packaged food of the day and was the analyst behind Dr. Harvey W. Wiley's book, *1001 Tests*.

Tom Rector's technical jobs and achievements are too numerous to list here. Commercial mayonnaise and commercial Russian dressing were among his earlier achievements. The "Vita Pack" method of preservation of shredded moist coconut and the vacuum packaging of cashew nuts were some of his outstanding developments.

In 1922 he joined Franklin Baker Co. as chief chemist in charge of research and development, becoming chemical engineer and director of research ten years later. In 1939 he was made general manager of the Central Laboratories of General Foods, being transferred to the main office in 1943 as manager of research and development. Shortly thereafter he was appointed vice-president in charge of research and development.

Tom was to have received the Nicholas Appert Medal on May 20 of this year at the institute of Food Technologists' meeting in Chicago. This award is for outstanding achievement in food technology.

In corporate affairs, Mr. Rector was an ideal head for a research department. He could talk the layman's language to his nontechnical top-level associates and the scientists' language to his subordinates. He understood how to be an effective buffer between the demands of aggressive top executives and the patient and time-consuming processes of research. He knew how to present ideas and information effectively. He was beloved by all who knew him.

Young food technologists should take a leaf from Tom Rector's book. He not only achieved outstanding success, but he contributed much to those with and for whom he worked, and to the industry in which he made his career.

▪ Success Likely in Concentrating and Freezing Milk

Predictions and counter-predictions about the future of frozen concentrated milk have been made since the January meeting of the frozen food packers. Those who have made a notable success of frozen citrus concentrates now are turning their attention to market milk. Those who know milk better are sounding warnings of difficulties to be overcome.

Our own guess is that the proponents of frozen concentrated milk will succeed. Ever since the practical development of low-temperature vacuum evaporation of citrus juices, we have felt that fluid milk could best be concentrated by this method. Furthermore, milk has no desirable volatile flavors to be recaptured or compensated for loss. On the other hand, many milk technologists have grave doubts about the ability of a frozen concentrate to reconstitute into an acceptable milk.

Without minimizing the genuine technical problems to be solved, we should note that it was a group of people who did not know too much about citrus juices who made a success of that concentrate—at one plant, at least. Other concerns with lengthy experience in the citrus field had not gained an advantage over the newer entrants either in time or commercial achievement. Seemingly, all started alike, technologically speaking, and our best guess is that long experience in fluid milk will not give its possessors any great advantages over the newcomers.

The potential rewards for success are so enormous that the best brains of the country will be attracted to solve the problems of producing the concentrate. Fluid milk handlers should be ready to grasp the new method, rather than oppose it in the customary obstinate manner of resisting change which upsets the status quo.

▪ Safety Guards Should Be Built Into Food Machinery

One tangible technical result seems to be developing from the President's Conference on Safety held in Washington last year. This is a series of specific recommendations by the engineering committee of the Conference.

One of these recommendations is particularly important to builders and buyers of machinery for food processing. The recommendation is that safety guards be designed and built in as an integral part of such equipment. Every food factory operator knows that much of the equipment now used does not comply with this recommendation. It is necessary, in too many instances, to have some incidental gadget or auxiliary device attached to a machine in a makeshift fashion.

A safety device which is added as an afterthought not only is likely to work poorly, but it may be in the way of the operator.

Those who specify the requirements for new equipment now can reasonably demand the proper built-in safeguards.

PRACTICAL IDEAS

Four Screw Trough Conveyor Hints

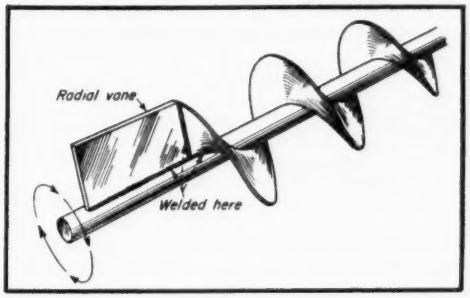
Improved and diversified operations have been made possible through four simple alterations of screw-type trough conveyors at the plant of Taylor Reed Co., Glenbrook, Conn.

The first modification provides for side discharge, the second converts a trough type to a tube, the third expedites lid removal, and the fourth pertains to alignment of a screw conveyor shaft. Here are the details—

Radial Vane for Side Discharge

The company found that a bottom discharge trough conveyor can be converted for side discharge, or the efficiency of an existing side discharge unit increased, by removing a portion of the screw flight at the discharge end and replacing it with a radial vane.

The section of the screw flight to be removed is marked and the flight welded to the shaft back of where the cut



VANE functions as paddle, effecting side discharge.

is to be made. This prevents the flight from unwinding. The flight section to be removed is then cut away with the torch.

A radial vane the same height as the flight is welded to the remaining flight and to the shaft proper (see sketch above).

As the screw turns, moving material forward through the length of the trough, the vane acts as a paddle wheel forcing the material out the side discharge.

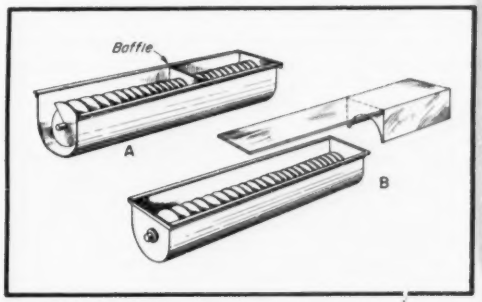
Trough Conveyor Becomes Tube Type

There may be occasions in production line changes where a tube type screw conveyor is required and only a trough type is on hand. The company showed that the latter can be converted to function for some applications almost as well as the tube type.

The tube screw conveyor can deliver material under pressure and is better than the trough for metering and conveying at an elevated angle. Two methods of converting a trough type screw conveyor to deliver under pressure were worked out successfully.

One method (see sketch A) is to weld a baffle in the trough several feet from the discharge end. This baffle extends from one side of the trough to the other above the screw flight and up to the lid. The section just over the flight is cut in a semi-circle, leaving only sufficient space for the flight to clear.

Greater pressure can be built up by welding a curved section similar to the trough bottom to the trough lid at the discharge end (see sketch B). This half cylinder should be about three flights long.



TWO WAYS to convert trough to tube type.

When the lid is lowered into place, the section forms a tube around the flight at the discharge end. The trough type is now in effect a tube conveyor for this distance.

Lid Comes Off Fast for Cleaning

These food plant trough conveyors require frequent cleaning, especially when they are used for carrying different products. Trouble is that the job of unscrewing and rescrewing nuts from hundreds of bolts to remove the conveyor lid and later replace it requires excessive time.

An arrangement for doing this work easily and in only a few minutes time was devised by the company.

The standard trough conveyor has an angle iron fastened to the upper edge of the sides of its "U" section. One leg of the angle iron is parallel to the sides of the "U" and the other extends out horizontally. The vertical section is welded to the sides of the trough on the outside. The flat

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You are invited to submit Practical Ideas. You will be paid at regular rates when your item is printed and if it is judged best for the month you will get additional pay of $25.

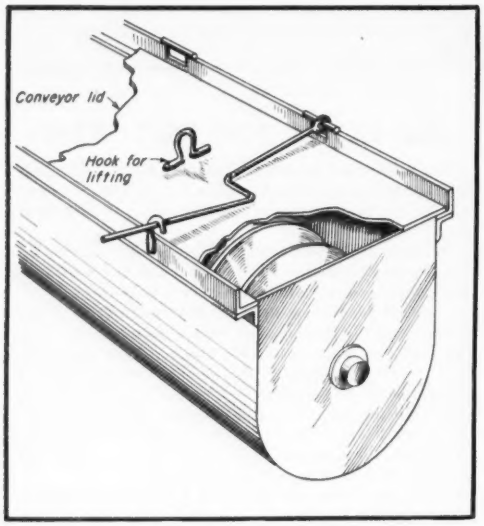
Selection of the best contributed item will be made by a group of 200 readers each month, and the item title and author's name will be cited (see below).

Practical Ideas may describe any type of device or method recently developed to solve a problem, speed an operation, or make some task easier. They may concern factory, laboratory, warehouse, or power-plant operations in the food industry. Ideas on management, maintenance, and trucking or shipping also are suitable.

You need not be an experienced writer or draftsman to submit these ideas. The text will be edited and sketches converted to finished drawings.

Send your items to: Practical Ideas Editor, FOOD INDUSTRIES, 330 W. 42nd St., New York 18, N. Y.

■ ***MARCH PRACTICAL IDEA voted best by our reader-judges was "Trough Drains Pay Dividends." So an extra $25 goes to the author—James L. Dooley, of Halter's Pretzels, Inc., Canton, Ohio—The Editors.***



ROD CLAMPS hold lid on tight, are released quickly.

lid is bolted to the horizontal leg of the angle iron when bolts are used.

The new method calls for a "Z" section. This is attached in the same manner as the single angle iron, with the extra leg extended vertically above the trough (see sketch). This leg guides the lid into place easily and quickly.

Attached to one of the "Z" sections are ½ in. dia. drill rods. The rods are cut about 9 in. longer than the distance between the vertical guide legs. A loop is formed on the end of the rods large enough to fit around a ½-in. pin.

The pin is placed in the loop and the drill rod bent counter clockwise and at right angles, with the bent side parallel to the pin. The bend is made at a distance from the loop equal to one half the distance between the lid guides (see sketch). At a distance of 4 in. from the first bend the rod is again bent at right angles, this time clockwise.

The second bend is not in the same plane with the first. It is at a slightly elevated angle, so that if the rod and the first leg of the triangle are rested on the conveyor lid, with loop just beyond the edge, the section of rod beyond the last bend will be elevated 6 in. above the other edge of the lid.

Slots, 1 in. by 1 in., are now cut from the top of the lid guide on one side, 10 in. apart. Rod loops are fitted into these slots with pins across the openings. The pins are welded to the top edge of the guide on both sides of the slots (see sketch).

This forms a hinge for each of the drill rod clamps. Hooks made of bent rod are welded to the opposite lid guide, and they are so located that the elevated legs of the drill rods can be forced under them when securing the lid.

When the lid is in place, the drill rod ends under the hooks, considerable pressure is exerted on the lid by the 4-in. sections of the drill rods, throughout the length of the lid and at its center. The extent of the pressure depends upon the angle at which the rod is elevated above the lid at the last bend in the rod.

To prevent bending along the center, due to pressure, the lid should be reinforced. Also, because of the increased weight of the lid, bent-rod loops are welded to it to provide means of raising and lowering by hoist (see sketch).

Each clamp can be easily forced under its hook and likewise easily unhooked by slipping a short length of pipe over the end of the rod for leverage. When unhooked (for opening the lid) the clamps hang down from their hinges clear of the conveyor, but being attached, cannot be misplaced or lost.

How to Align Screw Conveyor Shaft

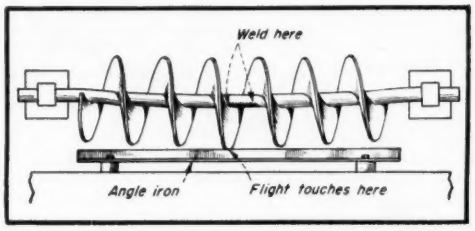
Warped screw conveyor shafts can be quickly brought into very good alignment by a simple method the company has devised.

These screw conveyor shafts are often bent or warped when they are pulled for cleaning. They are most likely to warp when they are cut with a torch for shortening or if flights are changed.

Sometimes when flights scrape the trough, due to a bent shaft, they are trimmed where they scrape to end the binding and the noise. After trimming, removal of the flight for cleaning may become a difficult operation and frequently requires the use of a chain hoist.

One way to take the warp or curve out of the screw conveyor shaft is to use an arbor press. With a long shaft and a small press this is slow and difficult.

The company's way is much simpler: The shaft with flights attached is rested on its bearing journals in V-blocks,



BEAD goes on shaft where flight is nearest angle.

which in turn rest on wood blocks or other supports. An angle iron is now set up as close to the side of the flights as possible without touching when the shaft is rotated on its bearings.

The shaft is now slowly rotated and then stopped at the point where the flight is nearest the angle iron. A bead a few inches long is then welded on the shaft nearest the point where the flight is closest to the angle iron (see sketch).

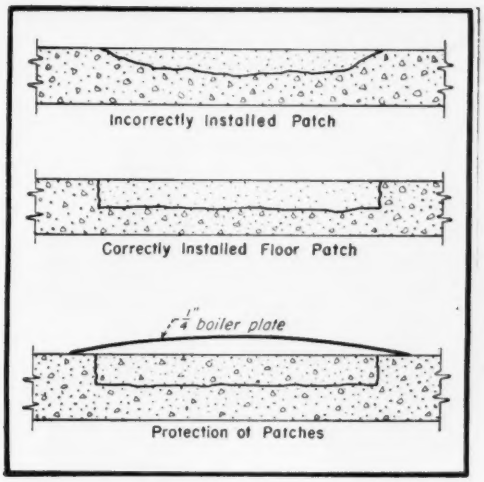
By the time the welder has removed his safety mask, the shaft will have pulled into better alignment. The shaft is again rotated and another bead of welding placed on it at the point where the flights are now nearest the angle iron. The process is repeated until the shaft is brought into very good alignment.—*W. A. Reed, Plant Engineer, Taylor Reed Co., Glenbrook, Conn., and Ivan C. Miller, Editorial Consultant, "Food Industries".*

Five Rules for Good Concrete Floors

For laying a high quality concrete floor, five simple rules are recommended.

1. For the top layer, use a coarse aggregate (pea-size rock). This produces a hard stone working surface rather than a relatively fine sand surface and greatly prolongs floor life.

2. After the surface is placed, it should be worked, preferably with a mechanical float. Care should be exercised not to overwork it in order to avoid forcing the aggregate down into the mix.



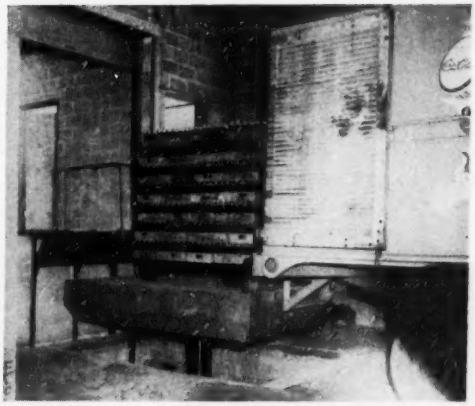
3. Cure the concrete properly and for a sufficient period.

4. Apply hardening compound (sodium silicate, fluosilicate, or other chemicals which prevent dusting) when the floor has set, and before it is used.

5. Do not use the floor too soon.

And here are tips on proper repair: In patching concrete floors, the old wearing surface should be chipped off, to a depth of at least 1 in., and squared at the edges. Then, the roughened surface should be thoroughly cleaned of loose particles and saturated with water for several hours before placing the new concrete. The area surrounding the patch should also be wetted.

Shown in the diagram are correct and incorrect patching and a method for the protection of patches.—*Portland Cement Association*

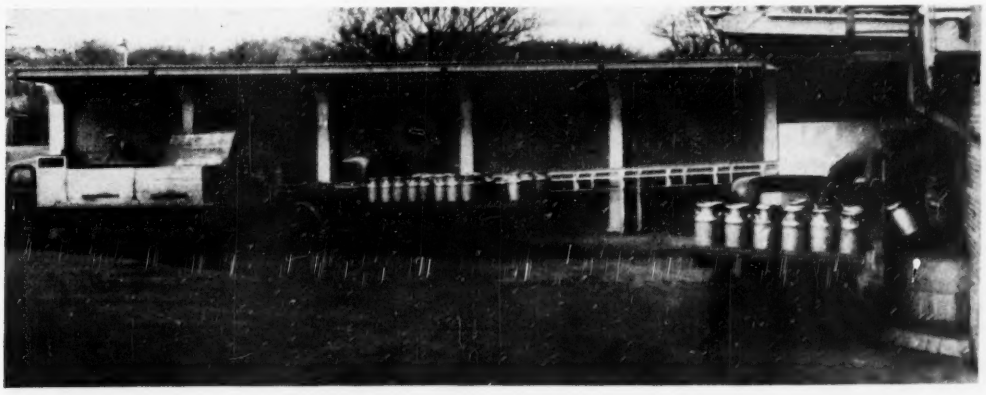


Bottles Handled Faster, Breakage Cut

At the Coca Cola bottling plant and warehouse in Madison, Wis., hydraulic lifts (see photo) are facilitating trailer loading and unloading.

To the warehouse go palletized cases of finished product by trailer truck. The truck also delivers returned empties and other necessary supplies for beverage production at the bottling plant.

As the trailer is loaded or unloaded, the height of its bed is altered up or down with the varying load. And, since the trailer is meeting a fixed platform there is a changing difference of level between the two. The hydraulic lift, installed in between, compensates for this difference, thereby speeds the operation. The smoother transfer jobs have reduced bottle breakage. And man-hour requirements have been pared.—*Ivan C. Miller, Editorial Consultant, "Food Industries"*



THIS SYSTEM MOVES MILK CANS FAST AND EASY

Unloading of milk is highly systematized at Borden's plant in Oklahoma City.

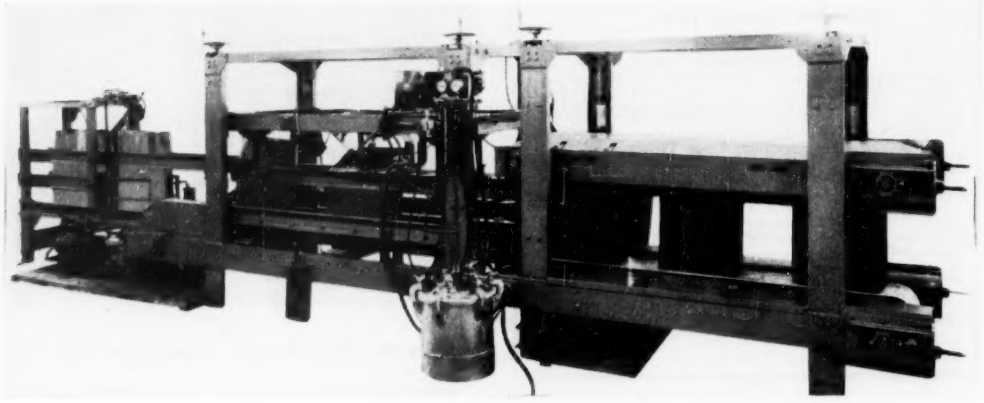
Driver at far right in photo is unloading 10-gal. cans on to enclosed double conveyor. Inner line goes to Grade 1 receiving room, while outer line (where he is seen placing solitary can) travels to Grade 2 receiving department.

Clean, sterile empties are returned on double conveyor line (seen under the canopied brick screen in background).

This loading-unloading set-up makes maximum usage of available space for truck movements while avoiding congestion of vehicles.

The wide canopy over the lines also protects drivers during rainy weather.—*The Austin Co., Engineers & Builders, New York City.*

Food Equipment News



Unit Automatically Folds, Seals Shipping Bags A

Now in production, a new machine automatically folds, glues and seals large multiwall paper shipping bags containing small unit consumer-size sacks.

The first machine has been installed at the Long Island City, N. Y., plant of National Sugar Co. It is handling 18 shipping bales a minute. The bags contain either twelve 5-lb. sacks or six 10-lb. sacks of sugar. Known as the 100-BCS, the machine also handles such commodities as flour, coffee, and other products of small unit sizes.

The machine consists of three units—the infeed conveyor, folding conveyor, and compression conveyor. Open paper bags containing the filled sacks feed in automatically, and by the time the bags travel the machine's 30-odd feet, they are firmly packed, sealed and ready for chuting to loading platforms.

The infeed conveyor accumulates the bags and provides the right timing for the release of individual bags to the folding mechanism. Tripping of the holding device frees the leading package from the accumulated group, releasing it into the pusher bars of the folding conveyor. The package next in line is caught and held until the folding unit is ready to accept it. The cycle is repeated to provide a steady flow of containers.

The folding conveyor transports the bales through guides. Properly timed and positioned plates close the top of the bale. Forward gusset of the bale is forced down by a shoe as the bag progresses through the guides. The rear gusset is wiped down by a rotating device. The glue seam is applied by a spray gun which is actuated by the passage of the bale. The spray gun controls the pattern of the glue, applying the proper amount of adhesive on the upstanding ear of the bag top.

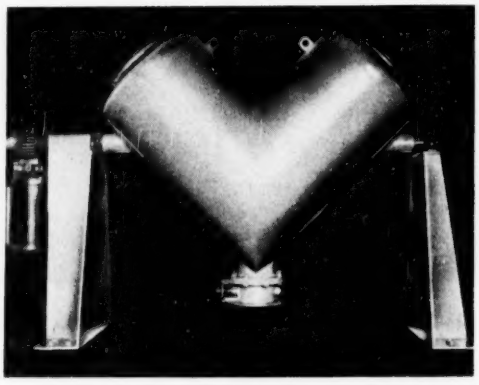
Final fold is performed by a shaped plate which folds the glued ear across the top of the bale and holds it down as the packages are conveyed into the compression conveyor.

Bales are propelled through the folding conveyor by pusher bars motivated by two chains. The timing action of the infeed conveyor places the packages in the pockets created by these pusher bars.

The compression conveyor receives the folded and glued package and applies pressure to the newly formed seal. Properly spaced heavy rolls assure constant, even pressure on the bag tops, regardless of variations in the individual packages contained within. Two micro-switches actuate a relay which starts and stops this short compression unit in proper holding time for each package.

Packages may range from a low height of 12 in. to a maximum height of 22 in. Maximum width of 15 in. is allowable. Length of the bale can reach 24 in. Larger or smaller packages may be handled on specially adapted equipment.

It is stated that in most plants installation of the machine will decrease by three the number of persons now required to close and seal containers by sewing methods. The container bag itself can be reduced in length up to 1½ in. as compared to bales that are sewn closed.—*Engineering & Machine Div., St. Regis Paper Co., 230 Park Ave., New York City 17.*



"V-Blends" Dry Materials B

For the mixing of dry materials, a unique apparatus has been developed known as the P-K Twin Shell Blender. It consists of two cylindrical shells of equal diameter but

joined together to form a V rather than a long straight tube. This V-unit rotates about a horizontal axis that passes approximately through the geometrical center.

A dust-tight discharge valve is located at the apex of the V. At the end of the two legs are standard access covers with swing bolts and dust-tight gaskets. If necessary to prevent dust while loading, the machine can be set in the reverse position and fed through discharge valve.

In operation, the unit is set in normal upright position and charged through either or both access openings until about half full (this point varies with different products). With valve and access openings closed, the machine is rotated slowly about the horizontal axis. In a few minutes, the time varying with different products, a perfect blend is reported obtained.

After setting the machine at normal vertical position the mixed product is discharged.

Unit can be readily cleared out, after each blend, through the access opening. There are no baffles or other obstructions to retard cleaning or to cause products to "hang up" and prevent thorough mixing while in operation.

Sizes of the blender range from 1 to 300 cu. ft. capacity. Power requirement (based on materials of 50 lb. per cu. ft. density) range from ¼ to 20 hp. Other drives are available for heavier products. Standard motors supplied are integral gearhead type, with built-in magnetic brake for close control in "spotting" the unit for charging and discharging.

Available are small test blenders that are built of strong, transparent plastic so that those in charge can watch how the blending takes place and check its effectiveness.

A test laboratory is maintained where those with blending problems can send samples for time-and-effectiveness tests. It is suggested that not less than 8 qt. be sent.—*Patterson-Kelly Co., Inc., 12 Burson St., East Stroudsburg, Pa.*

Quickly Tells Water Hardness A

In approximately 1 min., total water hardness may now be accurately measured by a new simple method, it is reported. Hardness caused by calcium alone may also be determined. The new Hagan Total Hardness Test, as it is designated, is made with equipment and reagents now made available to industry.

Involved is a simple, direct titration with a distinct color change at the end point, so that the possibility of error due to subjective judgment is eliminated.

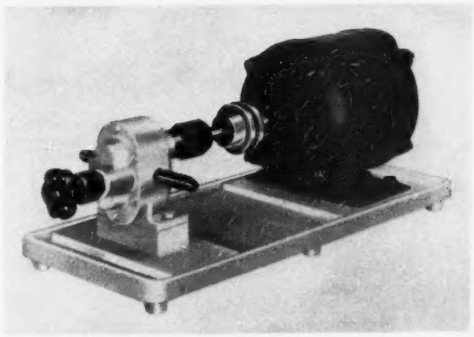
Thus time now given to the old tedious methods may be saved. For no complicated heating, waiting, filtering or estimating is required. The answer, termed correct to less than 1 ppm. of calcium, is found in about 60 sec.

Where it is desirable to determine hardness due specifically to magnesium in the water, the operator makes the total hardness test and the calcium test, the difference giving him the magnesium value.

A clear sample of the water to be tested for total hardness is measured into a porcelain dish. A small amount of buffer solution is stirred in to bring the sample to a suitable pH value. Indicating solution then is added and stirred. The sample at this point shows a red color. The final step is addition of the titrating solution, which turns the color to blue. Disappearance of the last trace of reddish tinge marks the end point.

Procedure for hardness due to calcium alone is identical, but with a different buffer solution and indicator, and with final color after titration a violet blue.

It is stated that both tests have been applied to thousands of samples of water (raw, feed, softened) and have proved to be uniformly accurate.—*Hall Laboratories, Inc., Pittsburgh.*



S.S. Pumps Are Compact B

Newly available stainless-steel self-priming pumps have compact design. Sizes available are, 3-, 5-, 10-, 20-, and 30-gpm. Handy manual by-pass valves are included on each pump for easy regulation of pressure and flow rate.—*Ertel Eng. Corp., Kingston, N. Y.*

DON'T MISS THESE . . .

Unit feeds materials to variable pressure zone, allows differential between in and out point.....Page 130

Vibrating conveyor requires only 14½-in. headroom from base to trough bottom.....Page 132

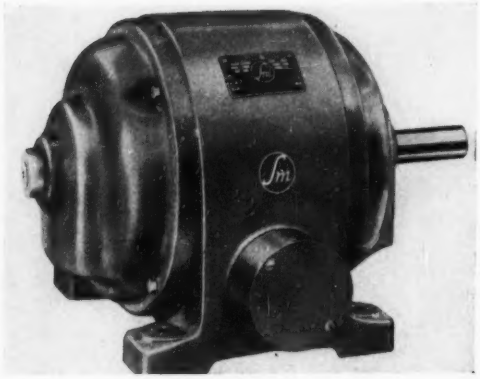
New electrical unit sterilizes water and other liquids without heat or addition of chemicals....Page 133

Quick size adjustment for wide range of folding packages marks cartoner.....Page 134

AND WATCH FOR . . .

Continuous indicating and recording of liquids in process with new instruments.....In June FI

Disintegrator, having dual discharge, separates waste as principal is produced.....In June FI



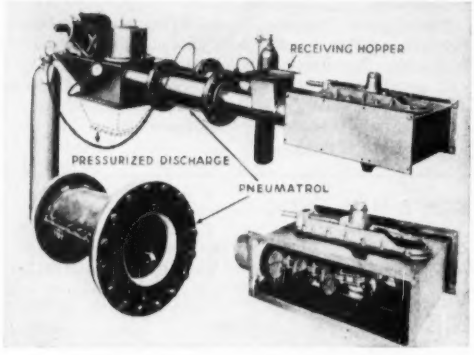
S. P. Motor Mounted In Any Position A

For locations subject to direct streams of water or other liquids, a new design of splash-proof motor has been recently introduced.

This motor may be mounted in any position and will keep its splash-proof features. The end bells permit free passage of ventilating air through integrally-cast baffles, preventing splashing liquids reaching the motor interior.

Air is drawn through rear of motor and exhausted through shaft end, thereby blowing away foreign materials, water and liquids from not only the motor but also the assembly it is driving.

Motor incorporates labyrinth seals on shaft ends, assuring positive protection against entry of liquids into the bearing housings. All bearings are lubricated for life.—*Sterling Electric Motors, Inc., Los Angeles 22.*



Unit Feeds to Variable Pressure Zone B

With the apparatus shown above, material at atmospheric pressure can be fed into a zone which may be under pressure or vacuum.

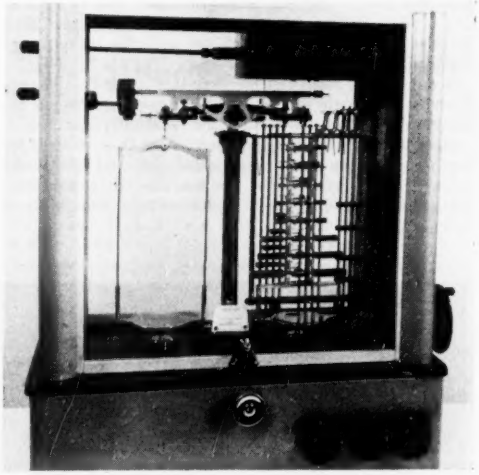
Pneumatrols in this unit allow a differential in pressure between the receiving and discharge point. They may be thought of as dividing the conveyor into two sections—an atmospheric section and a pressure or vacuum section—depending upon the individual requirements.

Material may be fed into the receiving hopper continuously at atmospheric pressure. It is then conveyed through the initial Pneumatrol into the pressure or vacuum section of the conveyor and discharged into a container under the same pressure or vacuum. The container is directly connected to the discharge section.

Since the conveyor is a closed circuit, the return run must have a second Pneumatrol to retain the pressure or vacuum in the container. This process can be reversed by a change in the conveyor circuit, so that material can be taken from a pressure or vacuum zone and delivered to a discharge point which is at atmospheric pressure or a differential pressure.

Inner sleeve of the Pneumatrol is a flexible member usually fabricated of rubber. It is mounted in the casing so that an air-tight annular space is created between the inner sleeve and the outer steel casing.

In the lower right of the accompanying photo the take-up box is seen with cover plate removed, demonstrating the accessibility of this assembly. The rubber flight chain assembly can be seen in position on the take-up sprocket. Solid construction allows no passage of air or material through the flights, consequently there is a continuous positive movement of material through the conveyor system.—*Hapman Conveyors, Inc., 2405 W. McNichols Rd., Detroit 21.*



Analytical Balance Easily Operated C

To weigh objects quickly with complete accuracy and without the use of computations or interpolation, a new analytical balance, the Speedigram, has just been recently introduced.

With this instrument, inexperienced operators have achieved weighing times of less than 2 min. The unit is proving to be an important factor in production laboratories for volume procedures.

The balance reads directly up to 100g. without weights. An extra 100g. weight is supplied, however, so that the full capacity, 200g., of instrument is available. Sensitivity of the balance is 0.05 mg. at full load.

Numerals appearing through the plate over the dials indicate the weights which will be deposited on the pan. Deposition is automatic when the beam is released. Readings are made across the dial so that no arithmetical sums need be computed, thus eliminating a major source of error in analytical weighing.

The balance has no complicated parts to get out of order, and its working parts are in full view.—*Voland & Sons, Inc., New Rochelle, N. Y.*

This is Why the Nash is the Most Simple Compressor

It's the Nash!

There are no mechanical complications in a Nash Compressor. A single moving element, a round rotor, with shrouded blades, forming a series of buckets, revolves freely in an elliptical casing containing any low viscosity liquid. This liquid, carried with the rotor, follows the elliptical contour of the casing.

The moving liquid therefore recedes from the rotor buckets at the wide part of the ellipse, permitting the buckets to fill with gas from the stationary Inlet Ports. As the casing narrows, the liquid is forced back into the rotor buckets, compressing the gas, and delivering it through the fixed Outlet Ports.

Nash Compressors produce 75 lbs. pressure in a single stage, with capacities to 6 million cu. ft. per day in a single structure. Since compression is secured by an entirely different principle, gas pumping problems difficult with ordinary pumps are often handled easily in a Nash.

Nash simplicity means low maintenance cost, with original pump performance constant over long periods. Data on these pumps sent immediately on request

No internal wearing parts.

No valves, pistons, or vanes.

No internal lubrication.

Low maintenance cost.

Saves floor space.

Desired delivery temperature automatically maintained.

Slugs of liquid entering pump will do no harm.

75 pounds in a single stage.

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DETERGENTS AND SANITATION CHEMICALS

KLEER-MOR
Popular wetting agent detergent for all hand cleaning jobs in the food industries. Rapid detergent and emulsifying action.

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Concentrated powerful liquid-type sodium hypochlorite disinfectant and germicide. Ideal for food plants. Leaves no film.

STER-KLEEN
Organic acid detergent compatible with all quaternaries. Removes lime film and alkaline deposits from equipment.

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An outstandingly powerful quaternary for sanitizing food plant equipment and preventing mold growth.

Offices in Principal Cities
A Klenzade field technician will gladly call and help you plan a complete plant and equipment cleaning program.

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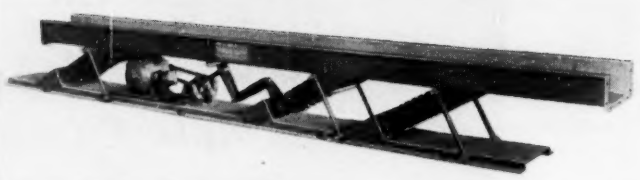
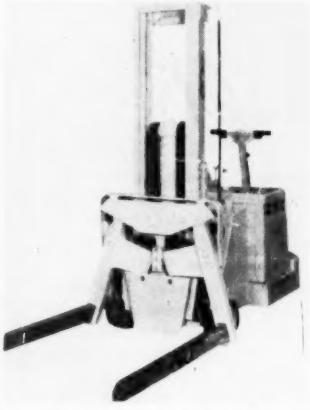


Vibrating Conveyor Has Low Headroom A

A wide range of materials can be handled at speeds up to 100 ft. per min. by a new natural-frequency vibrating conveyor.

Designed with simple coil supporting springs, this conveyor is stated to avoid the high stresses encountered in typical leaf-spring construction. Only three Sealmaster bearings are needed in the simple drive mechanism, reducing friction losses and maintenance costs.

Required headroom is only 14½ in. from base to trough bottom. The spring-supported conveying trough may be fabricated in a wide variety of shapes, open or closed, with screen deck for scalping, or with other variations to meet special conditions.—*Stephens-Adamson Mfg. Co., Aurora, Ill.*



Offer Adjustable Forks For Palletless Loads B

Odd handling jobs for particular industries can be performed without the use of skids or pallets by the first in a series of special Worksaver attachments to a line of battery-powered hand trucks.

To pick up loads, the unit is maneuvered so that the load is between the forks. The operator then manipulates a control lever which causes the forks to grasp the load in a pincher-like movement. The forks are lifted and the load transported or tiered as desired.

The tilting fork truck has a capacity of 3,750 lb., and travels at 2 mph. under full load. The mast tilts a full 21 deg. in 10 sec. to center the load. Overall dimensions of the truck, not including forks, are length 67¾ in., width 35 in. Overall mast height is 83 in., fork elevation is 56½ in. Use of large capacity batteries—23 plate lead-acid, for example—often provides two days' operation without recharging.—*Yale & Towne Mfg. Co., Philadelphia 24.*

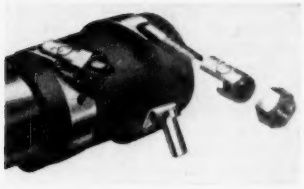
Triple-Beam Assembly Features New Scale C

For compounding, mixing and blending, a new ingredient batch scale with a triple-beam assembly is now available.

This new 200 lb-capacity scale, Model 1745, is reported to make it possible to mix many ingredients on

Uses Polaroid Elements D

Twelve new model microscopes are announced incorporating highly efficient Polaroid optical elements. Latter are reported to make saving over previously used calcite.—*American Optical Co.'s Instrument Div., Buffalo, N. Y.*



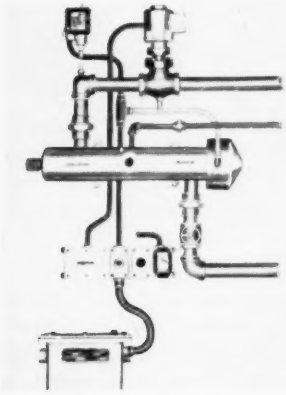
Clamp Goes on Fast A

This hose clamp can be tightened quickly, and from any angle, with an end, socket or speed wrench. Clamp is wrap-around type. Split thread design provides push-pull action and assures a full seal.—*Blaisdell Mfg. Co., 1404 Alamitos Ave., Long Beach 13, Calif.*

---

a single model where heretofore many separate scales were used.

The special over- and underweight indicator speeds the weighing operation, yet makes visible any weight discrepancy, standardizing the finished product according to predetermined specifications. Ruggedly built with a white enamel finish, the scale has a polished aluminum head.—*Detecto Scales, Inc., 540 Park Ave., Brooklyn.*



New Electrical Unit Sterilizes Liquids B

Rapid sterilization of water and other liquids without heat or addition of chemicals is accomplished by a new electrical unit recently announced.

Known as the Steritron, it employs an ultraviolet source of high intensity. Completely automatic, the unit affords continuous flow sterilization. It is designed for wall mounting.

Units is built of stainless steel throughout. It is equipped with an automatic wiper device for internal cleaning, and it has transformer and

From Coast to Coast

PACKERS ARE CHOOSING THE MODEL FF

Our Model FF was designed specifically to wrap frozen foods. And packers were quick to take advantage of its many unique features. Today it's the *fastest-selling machine* in the frozen food field!

CARTONS or METAL-END FIBRE CANS

Whether you use cartons, metal-end fibre cans, or both, the FF is your best bet. Its extreme versatility enables you to maintain a uniform appearance for your entire pack. Moreover, where metal-end cans are used, you make a real saving, because over-wrapping eliminates the need for printing cans in small quantities.

IMPORTANT FEATURES

Your product can be wrapped either before or after freezing. The Model FF automatically makes allowance for variations of up to ¾" in the width of packages. Other features include an advanced, easy-to-clean lubricating system . . . Rust-proof parts where contact is made with the product . . . A device which makes the machine self-clearing . . . Quick adjustability for numerous package sizes, etc.

Its wrapping speed in excess of 100 packages per minute gives you the utmost in efficient, economical operation.

We believe you'll want the complete facts on America's fastest-selling frozen food wrapper—the Model FF.

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SPRINGFIELD, MASSACHUSETTS

NEW YORK CHICAGO BOSTON CLEVELAND ATLANTA DALLAS
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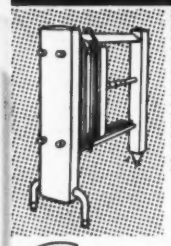
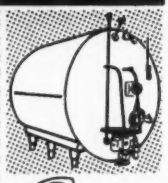
HOW MUCH Can These Products SAVE for YOU?



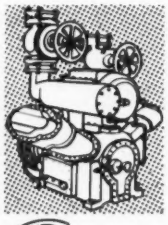


Cylindrical STORAGE TANKS

Provide the efficiency and economy of combining COOLING and STORAGE in one compact unit. Refrigerated section built integrally into the bottom and sides of tank. Double stainless steel welded wall section. Sizes from 1,000 to 5,000 gal.

Multi-Pass HEAT EXCHANGER

Cuts heating and cooling costs. Saves space. Can be used for heating or cooling a wide variety of liquid products, or as a High Temperature Short Time Pasteurizer.



Stainless Steel FITTINGS

Immediate delivery of most types and sizes from stock by the 21 CP branches listed below. See classified Directory for 'phone number of nearest CP Branch.

Refrigeration

Complete refrigeration equipment for foods, beverages, curling rinks and other purposes. Line includes: 2, 4, and 6 cylinder compressors, and boosters.

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CREAMERY PACKAGE MFG. CO. OF CANADA, LTD. TORONTO

controls that are oil immersed. Models are furnished for 110, 220, and 440v., 50, 60 or 25 cycles.—*Hanovia Chemical & Mfg. Co., 100 Chestnut St., Newark 5, N. J.*

New Shaft Couplings Installed Easily A

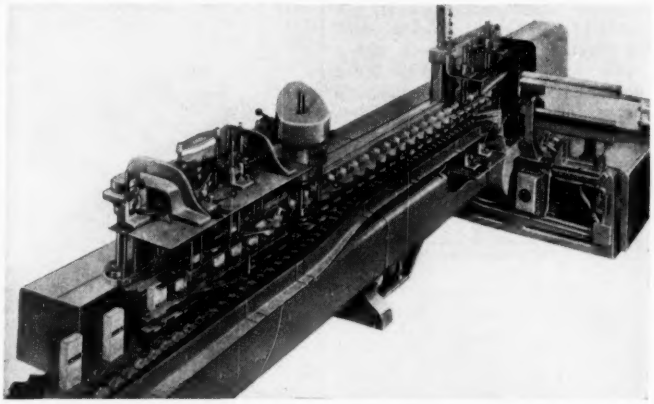
Simply constructed and easy to install or remove from the shafts of pumps or motors is a new Magic-Grip coupling.

Interchangeable with the old standard coupling, the new one is now available in two bore sizes—⅝ and 2⅛-in., both taking up to 120 hp. at 3,550 rpm. Other sizes will be added.

New coupling consists primarily of two cast iron disks with tapered bores, rubber covered tubes assembled on studs, split tapered bushings, and two set screws for each disc. Four drilled recesses in the bushing accommodate the "off" and "on" positions of coupling set screw driving holes.

To install, the bushing is placed on the pump or motor shaft. Since it is split part way, it slides easily. The coupling is placed over the bushing and the two set screws inserted into the "on" position holes. By means of a wrench, the screws are alternately tightened until they engage the recesses in the bushing. A key between the bushing and the coupling for driving the combination and lining up the correct "off" and "on" positions of both coupling and bushing makes mistaken placement impossible.

The set screws are tightened until the bushing is fastened on the shaft and the coupling and bushing tapers are firmly set. Normal tightening is all that is needed, since both bushing and coupling are machined so that excess pressure is unnecessary to secure the complete unit to the shaft. In dismantling, the procedure is reversed.—*Allis-Chalmers, Milwaukee.*



Quick Size Adjustment Marks New Cartoner B

To meet the need for a fully adjustable machine, capable of handling a wide range of sizes, a new semi-automatic cartoner has been perfected.

It can be quickly adjusted for an infinite number of carton sizes ranging from a minimum of ½ x ¾ x 2½ in., to a maximum of 3¼ x 3¼ x 8 in.

In operation, the machine feeds a folding carton (airplane or reverse tuck) from a magazine, opens it, and tucks the bottom flaps. Held securely by the transport lugs and guide rails, the cartons are carried upright along the loading stations. A maximum of three operators can be used to insert the load in the open top end of the carton, after which the top flaps are tucked and the finished package discharged for subsequent handling. Machine speed can be quickly changed through a range of 25 to 120 cartons per minute.

High operator efficiency is possible on a wide variety of loads. One operator can easily insert bottles, tubes, or similar products at 100 per min. Where corrugated liners, leaflets, or other inserts are used, space is available for additional operators.

Maker states all settings are precalibrated, and all parts can be adjusted quickly and easily to the correct position when changing from one size to another. Tests reportedly have shown that even the most extreme size change is made within 30 min.

For those products which are not made in sufficient volume to justify fully automatic machines, the new unit, at low cost, almost completely mechanizes the loading operation. It is termed especially useful for short runs of many sizes.—*R. A. Jones & Co., Inc., P. O. Box 485, Cincinnati, 1.*

PROTECTION AND *Beauty* FOR YOUR PACKAGED PRODUCTS

* Common Garden Snail

** Wood Duck (Male)

KVP PAPERS

For The FOOD INDUSTRY

ALL food products need **PROTECTION** from processing room to consumer's table.

There is a KVP wrapper or liner for nearly every packaged food product.

MANY food products need the **BEAUTY** of color and design for brand identity and sales appeal.

KVP artists and KVP printers are tops in their field.

For straight protection, or for protection **AND** beauty, you can depend on KVP.

INDUSTRIES SERVED

BAKING
Bread - Cracker
Cereal

MEAT
Packing - Locker
Retail

DAIRY
Butter - Cream - Cheese
Ice Cream - Milk

FISH - FRUIT - FROZEN FOODS
POULTRY - SHORTENING
VEGETABLE

*The common garden snail, *Stylommatophora*, is no beauty, but his shell is tops in protection for his tender body.

**Most beautiful of all ducks is the wood duck, *Aix sponsa*, which builds its nest in hollow trees, often far from water.

Kalamazoo Vegetable Parchment Company

PARCHMENT . MICHIGAN

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THE SHELF-SHAPE BAG THAT PACKS WITHOUT SLACK

Deltaseal®

One reason why more manufacturers are turning to the DELTASEAL PACKAGING SYSTEM*

Deltaseal Bags are flat . . . top and bottom . . . so, they're easy to stack in attractive, space-saving displays. There's no slack-pack appearance to discourage sales. The Deltaseal closure helps the bags keep that full-pack look. Housewives like this closure, too, because the "built in" spout makes easy pouring.

Deltaseal lowers packing costs. Deltaseal Packaging Machinery is designed for Deltaseal bags alone. It fills, shapes and closes the bags fast . . . 2,000 or more an hour, depending on the commodity. Mostly automatic, it handles volume packing with real efficiency.

Let a Bemis representative explain more of the benefits in the Deltaseal Packaging System. Call or write your nearest Bemis office.

***THE DELTASEAL PACKAGING SYSTEM**
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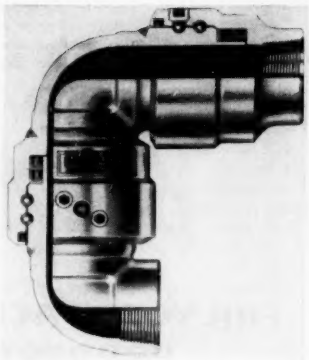

For 360-Deg. Swings — A

Through use of this improved, "full-circle" ball bearing coupling, pipes conveying fluids under high pressure can be swiveled a full 360 deg., to feed the liquid exactly where it's wanted.—*Gil-Lair Products, Inc., Pasadena, Calif.*

Equipment Briefs

Multiple V-Belts — B

New multiple V-belt, with 40 percent increase in hp.-rating over comparable sizes of standard V-belts used for high capacity service, is now available. Increased capacity is stated effected without stiffening belt construction or reducing safety factors. —*B. F. Goodrich Co., Akron.*

Light Hand Truck — C

Weighing less than 12 lb., new Model 40-D-600-SC all magnesium hand truck is noted for its lightness and heavy-duty load capacity. Stair climbers are fitted, permitting user to transport loads between two levels with less trouble and effort.—*Magline, Inc., Pinconning, Mich.*

For Keeping Floors In Shape — D

Disintegration and dusting of concrete floors is reported stopped with Stontop. Material is simply flushed and brushed on floors and, according to manufacturer, it makes them harder, more dense, and highly resistant to abrasive wear, syrups, acids, and water.—*Stonhard Co., 500 Stonhard Bldg., 1306 Spring Garden St., Philadelphia 23.*

Improved Hand Hoists — E

Simplicity of design, a new gear drive, Weston type brake, steel load chain, steel housing, self-lubrication, and drop forged top and bottom hooks are construction features of new hand hoists now offered. They are made in capacities from ½ to 4 tons.—*Wright Hoist Div., American Chain & Cable Co., Inc., York, Pa.*

Cleaner vs. Scale — F

In cleaning operations, formation of objectionable white deposit and hard scale is reported prevented by a new alkaline detergent. Where waters of a hardness of 5, 10, 20 gr., or higher are encountered, new detergent, Metso 55, softens them by reacting with calcium and magnesium salts to form soluble compounds.—*Philadelphia Quartz Co., Philadelphia 6.* —*End*

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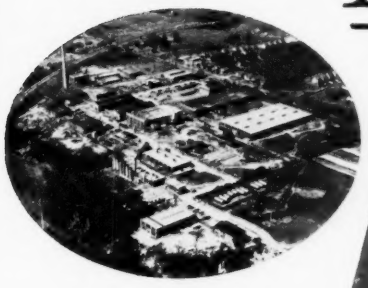

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No matter what you pack—or what type of container you require—it pays to know what Continental can do for you. Continental has a reputation for solving difficult problems, pioneering in new packaging techniques and in helping customers in every way possible.

If your problem is one of supply, Continental is big enough to handle large volume orders and flexible enough to meet emergencies. By shifting orders around among our thirty-six can manufacturing plants, for instance, we have often been able to pull a customer out of a tight spot.

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You can do likewise by using LIGHTNIN Mixers for mixing . . . blending . . . dissolving . . . emulsifying . . . washing . . . crystallizing . . . solids suspension . . . gas dispersion and absorption . . . heat transfer—and any other fluid process that can be helped by agitation.

There's no magic involved . . . just 25 years of specialized mixing know-how, available only from MIXCO. We make *all kinds* of fluid mixers, so our recommendations are impartial. And every LIGHTNIN Mixer carries a money-back performance guarantee! Write today for information, or an estimate.

LIGHTNIN—The original portable mixer—now world's largest-selling line. Nearly 30 models, ranging from ⅛ to 3 H.P. Electric or air motors . . . direct or gear drive. Shafts and propellers are highest quality stainless steel. Patented Double Mixing Action gives fast bottom-to-top turnover plus slow rotation, for fast uniform mixing.

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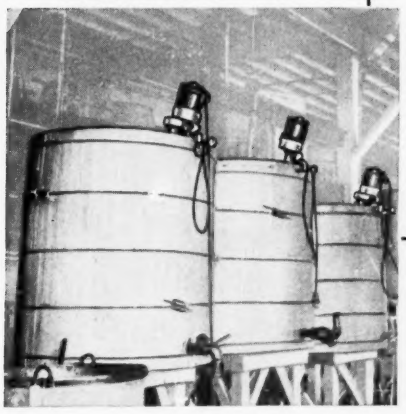
PROBLEM: (1) To blend vinegar, water and essential spice oils used in making mustard, and to dissolve salt in the emulsion.

(2) To keep mustard seed and spices suspended uniformly and prevent settling while drawing-off mixture to colloid mill where seeds and spices are ground.

Batch—585 gals. in a 714-gal. wood tank, 54" in diameter by 72" straight side, giving 12" freeboard.

MIXCO SOLUTION: Tests on a one-gallon sample of the mix were carried out in our laboratory. They indicated that satisfactory performance would be obtained in a 585-gallon batch by using a 1 H.P. LIGHTNIN gear drive portable mixer, with dual 12" diameter propellers on a 66" shaft, rotating at 431 RPM. Stabilizing fins on the lower propeller permit the unit to be operated while drawing-off tank contents. The LIGHTNIN Mixer was supplied with a totally enclosed ball-bearing motor, and with all wetted parts of Type 304 stainless steel.

Typical wood-tank installation of LIGHTNIN Mixers



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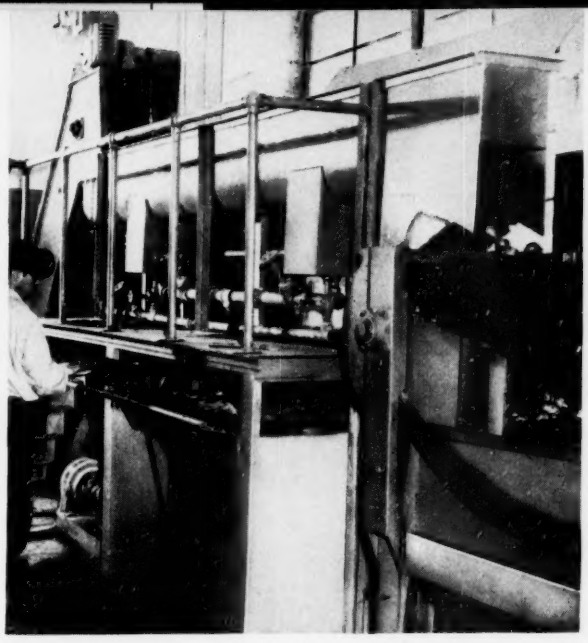
1 **POTATOES** dumped in hopper are conveyed (center) to processing.



2 **DESTONER** (left) removes pebbles and gives potatoes a preliminary wash before they go (right) to continuous washer.

Processing Quick-Frozen French Fries

Advanced Processing, Automatic Equipment Insure Uniform Quality

(Article on Page 113)

TOP EFFICIENCY in the manufacture of frozen French fried potatoes is exemplified in the new, continuous processing line operated at the Birds Eye-Snider plant in Caribou, Me.

The new processing line is detailed in the foldout flow diagram (right), and it is illustrated by accompanying photos numbered to key with the indicated points.

First step in the process is washing—depicted at Point 2. Here, potatoes are flumed through a destoner, pebbles being removed as the spuds get this preliminary wash. Tubers now continue through a washer, where any remaining dirt is washed off.

Next comes automatic peeling—Point 3. In this operation, washed potatoes are weighed into a rotary cooker. The 320-lb. batches are cooked under controlled steam pressure. Cooked spuds are then dumped into a hopper, where cold water sprays contract them so that the skins come off readily in the peeler. In this unit, tubers pass over rubber rolls that remove peelings. Overhead cold water sprays wash off adhering loose skin.

Trimming follows (Point 4). Two rubber belts carry spuds along a table, where girls remove eyes and any other defects.

Now to the actual preparation of the French-fry cuts. Potatoes are fed to the cutting machine (upper right of Photo 5), where they are cut into ½-in. strips. These get a pre-blanch inspection. Remaining small pieces, screened through a rotary separator, go to the frozen whipped potato line.

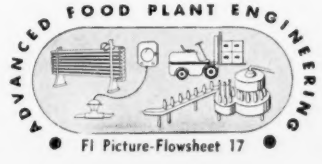
Blanching is the succeeding step. At this point, strips travel through a continuous drum blancher (Point 7).

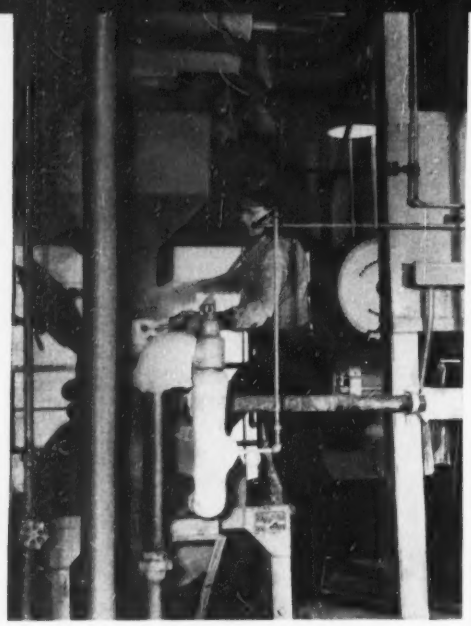
Two-stage frying (Point 8) is the next operation. Slowly revolving meshed baskets each carry a batch of slices through the stage of light browning. Then the slices pass to the final fryer and are uniformly browned.

Cooling follows (Point 9). In this step, the fries go through a 50-ft. cooling tunnel, served by an exhaust fan that pulls cold air from outside the building through filters.

Mechanized, high-speed packaging, the final operation (Points 10, 11, and 12), comes after a last inspection of the fries. Conveyed to the packaging room, they are chuted over a vibrator that feeds them to four fillers. Two carton-forming units supply the empties. Each 10-oz. package leaving the filling machines is check-weighed. Cartons are now closed and machine-wrapped with waxed paper that is then heat sealed. Finally, cartons are conveyed to the company's adjacent pea plant where the quick freezing facilities are maintained.

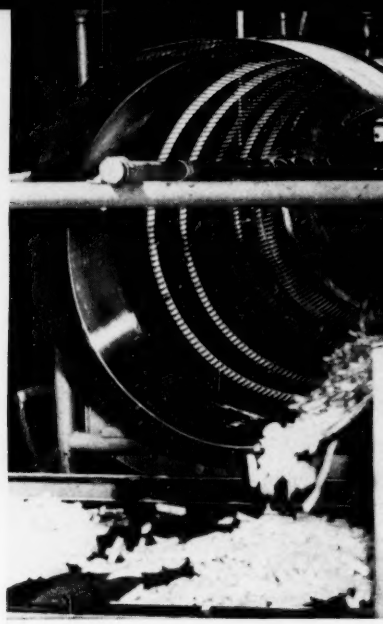
FOOD INDUSTRIES May 1950 Pages 140-143



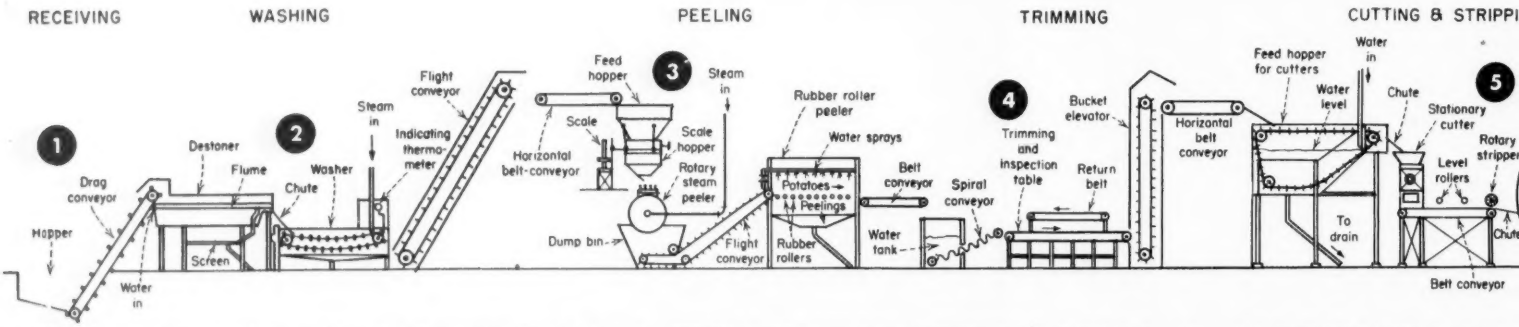


3 **THIS ROTARY PEELER** cooks potatoes with live steam at 100 psi. Unit handles a 320-lb. batch.

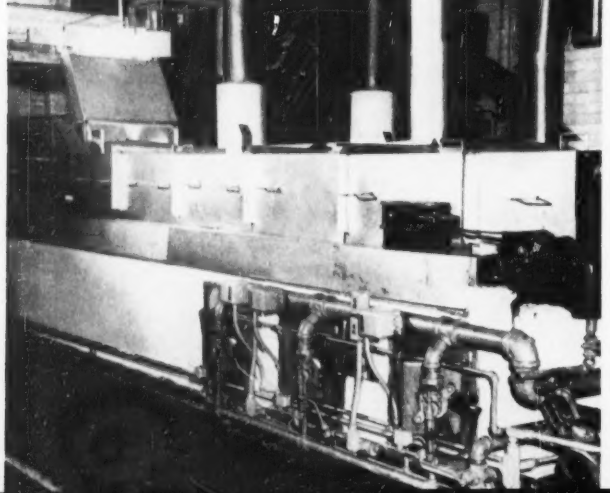
4 **PEELED SPUDS** are hand trimmed. Girls remove eyes, bruises, and other defects. All large potatoes are cut in half.



5 **CONTINUOUS CUTTER** (rear) slices spud rod separator screens out small pieces. The

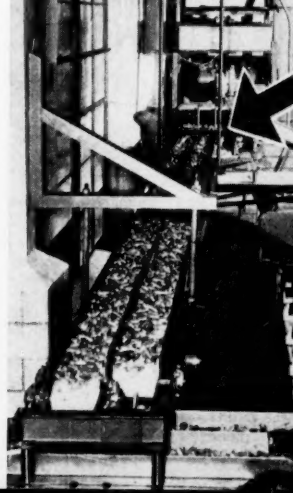


8 **FRYING** is two-stage, continuous step. Blanched potato slices are done to light brown in a first fryer, darker brown in second (seen here).



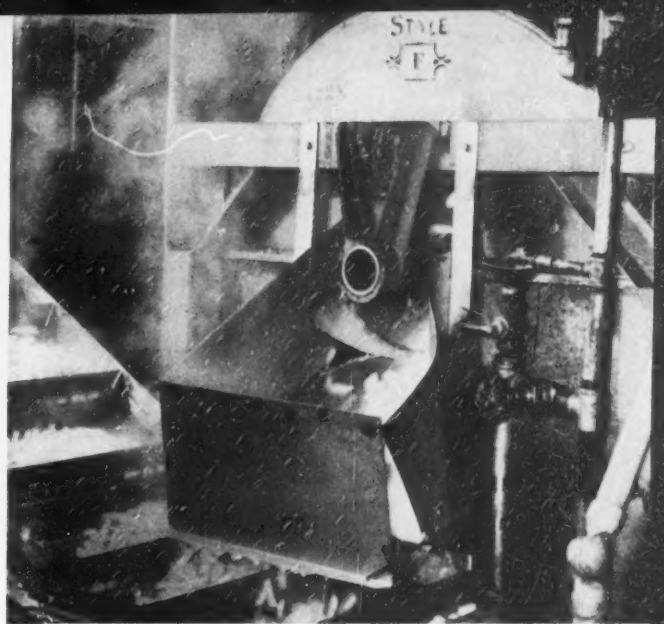
9 **FRENCH FRIES** come from cooling tunnel at 45-55 deg. F. An exhaust fan draws outside cold filtered air into tunnel.

10 **VIBRATOR UNIT** (arrow) fee to automatic weighing and fill

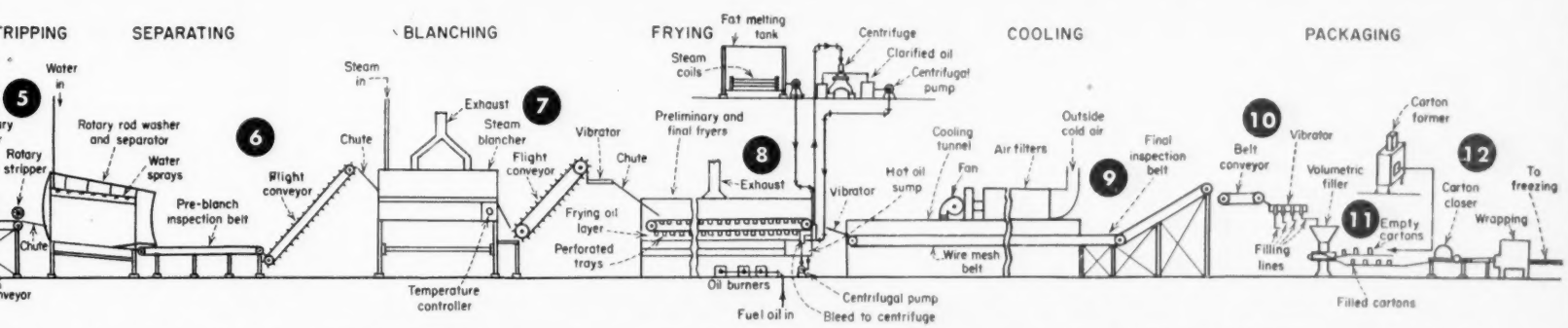


s spuds into ½-in. strips. Rotary
s. They go to whipped potato line.

6 **FRENCH-FRY CUTS** get pre-blanch inspection. Girls take out remaining small pieces, which are flumed to frozen whipped potato line.



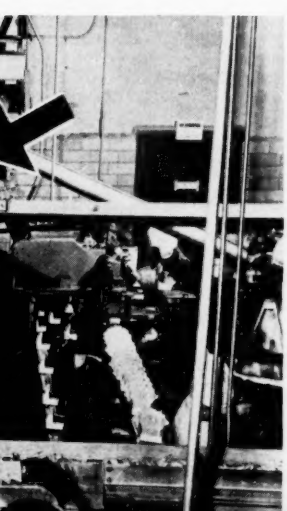
7 **CIRCULAR DRUM BLANCHER** live-steams the uniform strips of potatoes for a predetermined time. Blanching is a continuous operation.

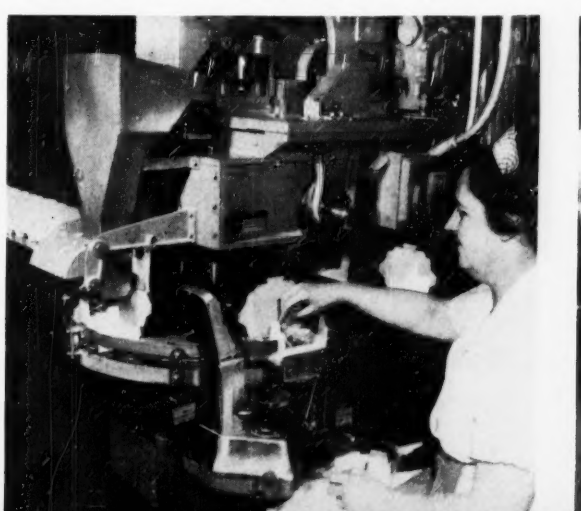


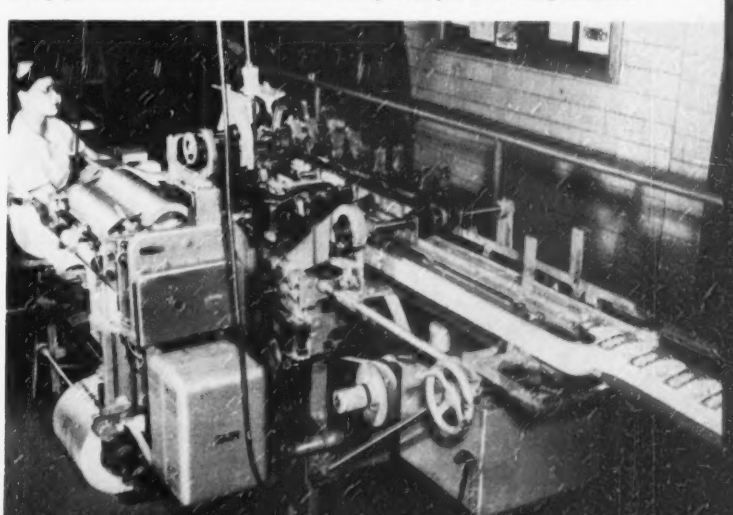
w) feeds cold fries into lanes going
nd filling machines.

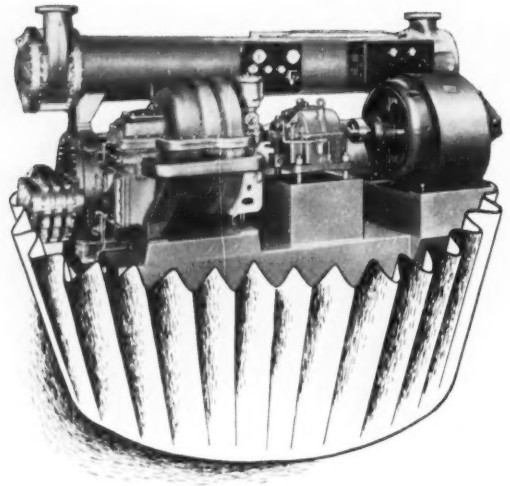
11 **FILLING MACHINE** puts 10 oz. of product in cartons. Empties (left) come from automatic carton-forming unit.

12 **HERE,** closed cartons of French fries are machine-wrapped with waxed paper and heat sealed. Cartons are finally conveyed to freezing facilities.









This is just a Sample

At Stephen F. Whitman & Son, Inc., Philadelphia, soft centers spiral down a conveyor from the cream room to a holding room. As they are needed they spiral down similar conveyors from the holding room to the enrobing room below. Savings over previous handling methods, say Whitman's, are "considerable."

They add that the system would be impossible without exact air conditioning in all three rooms involved. For that they depend on Carrier.

Whitman's have been maintaining quality and production with Carrier refrigeration and air conditioning equipment since 1916. Carrier air conditioning maintains exact temperatures and exact humidities in packing and storage rooms, in cream and stringing rooms, and at the cold end of the enrober room.

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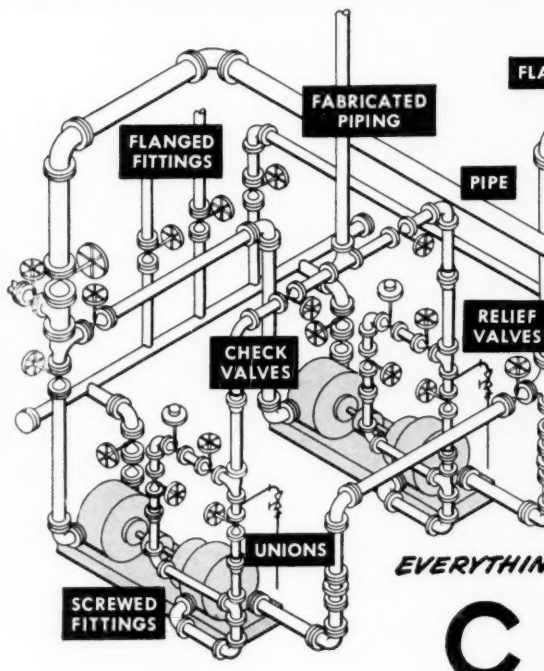

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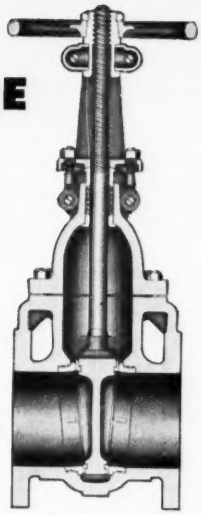

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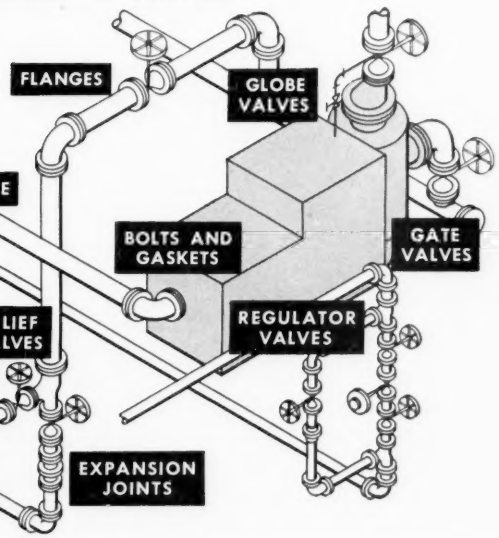

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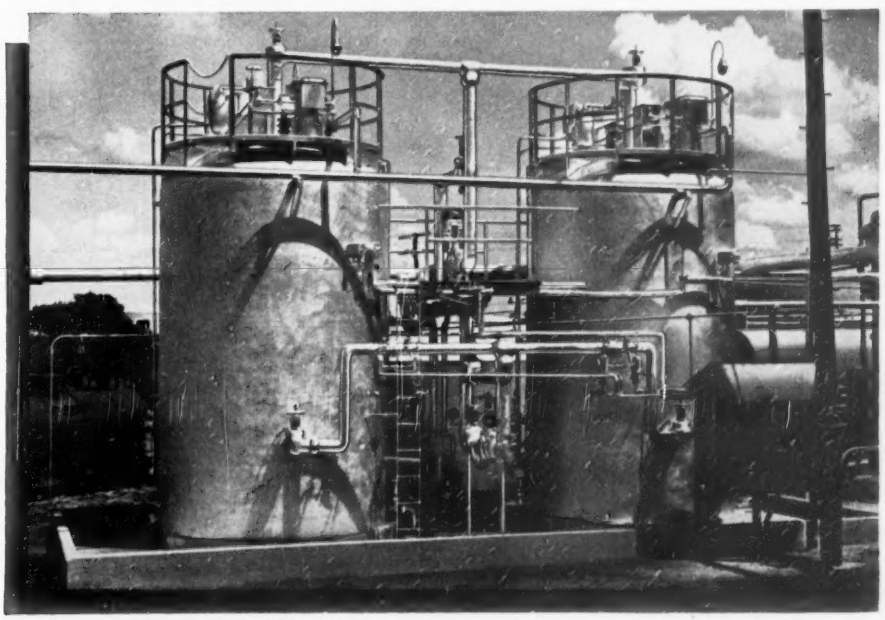

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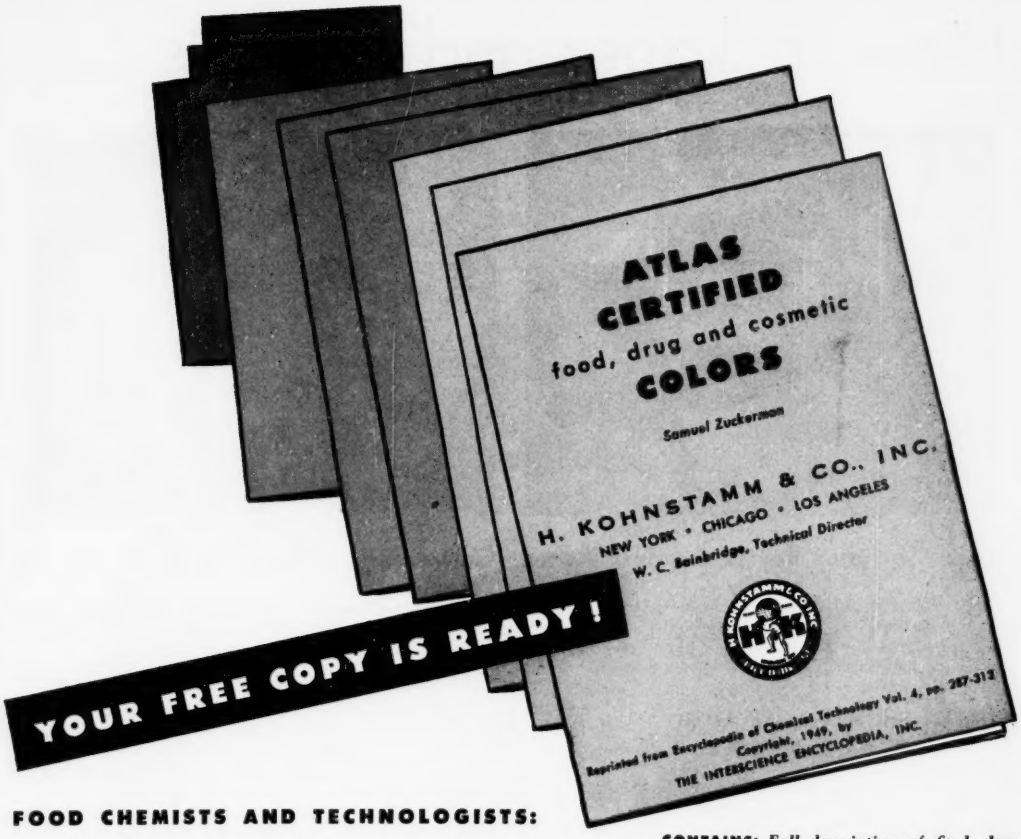
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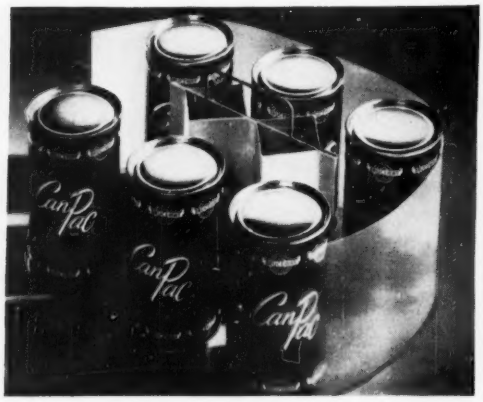


New Can and Bottle Carriers Accent Convenience, Boost Sales

AS A result of stiff competition on the self-service supermarket shelves, a radically new can carrier and two carry-home packages for bottles, all highlighting consumer convenience, have made their debut. Because of their handiness, they are stimulating multiple unit sales.

Can Carrier With Spring Action

Illustrated above is a bottomless, transparent carry-home package for canned goods. It consists of a simple cardboard web with a spring action that presses the cans against the wrapper. This outside band, of translucent or transparent material, exerts tension in the opposite direction so that cans are held firmly in place. Both cardboard web and outside band are held in position by the can lids.

For effective mass display, the handle can be folded flush with the cans. If desired, the transparent band may be printed with brand insignia or special sales messages. The container is unaffected by heat or cold, making it especially effective for refrigerated products.

The maker, Bruceway Eng. Corp. of San Francisco, says this new carrier can be integrated with packaging machinery and may be used on any existing canning line at speeds up to 600 cans per min.

The new package is expected to increase canned goods sales as manufacturer feels consumers will appreciate not having to juggle a number of small packages.

Handle-Carton for Quarts

Pictured below, left, is a new style returnable bottle carrier holding six quart-bottles. Made by Gaylord Container Corp., St. Louis, this "Karry Kit" was recently introduced in the Akron, Ohio, market and met with housewives' approval.

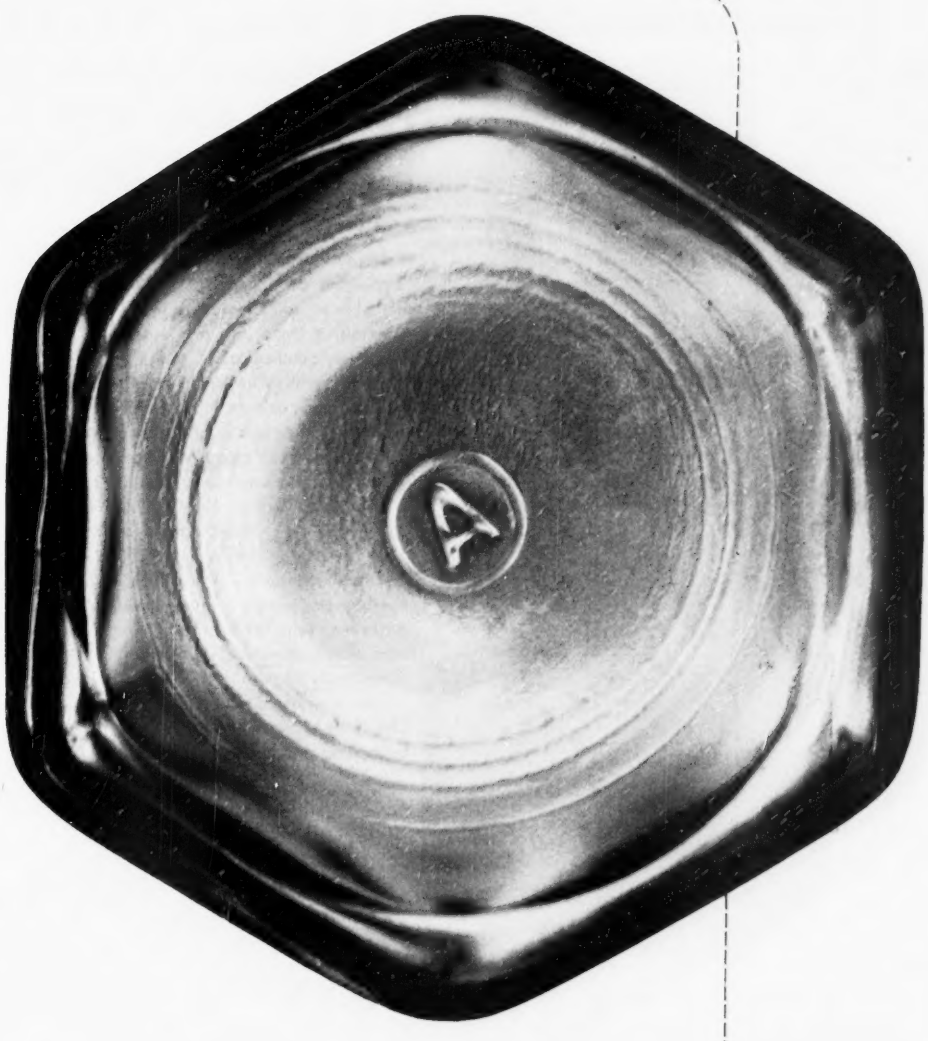
The carrier is a solid fiber tray with a convenient handle. It is made of thick, wet-strength Kraft fiberboard, hence will stand up for a number of round trips.

Extra-Strong Bottle Carrier

At bottom right is seen a soft drink bottle carrier made by Robert Gair Co., Inc., New York. Carton is "Tuf-Bord", the company's extra strong and rigid folding paperboard. Material is said to sustain Mullen, tear, tensile strength and rigidity tests better than usual folding carton.

Because of paperboard handle, bottling company does not have to insert inner carrying handles. The 6-cell carrier has a double wall between bottles.

The mark of good glass packaging design



For information see your Armstrong representative or write to Armstrong Cork Company, Glass and Closure Div., 4205 Prince St., Lancaster, Pa.

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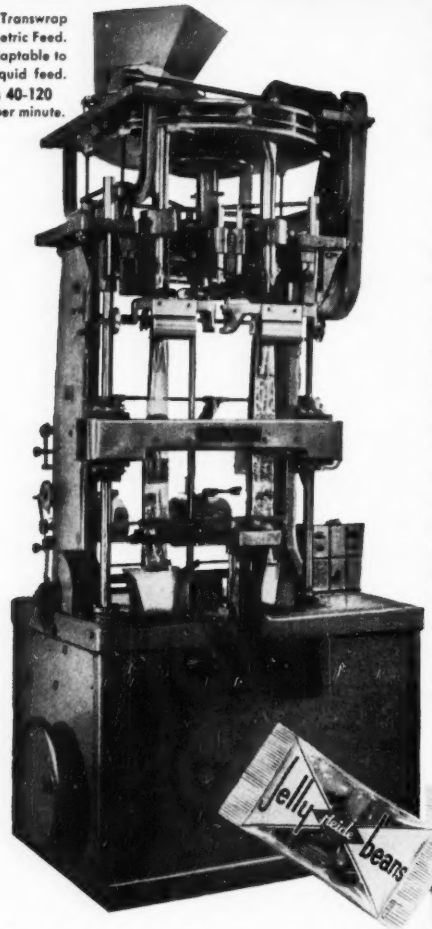

Model "B" Transwrap with Volumetric Feed. Also adaptable to auger or liquid feed. Produces 40-120 pkgs. per minute.

In one machine, TRANSWRAP is a self-contained "packaging department." Using cellophane, Pliofilm, glassine, roll foil or other suitable heat-sealing materials, it forms, fills and seals your package completely automatically.

The same TRANSWRAP machine with suitable feed assembly can package 1 aspirin tablet or 1 lb. of peanuts . . . 1 teaspoon of vanilla extract or 1 lb. of margarine . . . 5 grams of salt or 16 oz. of powdered milk. Package sizes possible range from ⅞" x 2" to 5¼" x 13". They may be either pillow, or "fin seal" type (sealed around four edges).

From the standpoint of economy, TRANSWRAP adjustments and operation are so simple, a single operator can handle a whole battery of machines. Attractive, sales-conditioned TRANSWRAP packages, *filled and sealed*, actually *cost less* than ready-made *empty* bags.

Custom-engineered adaptations are possible on any TRANSWRAP machine to meet your individual requirements with maximum efficiency.

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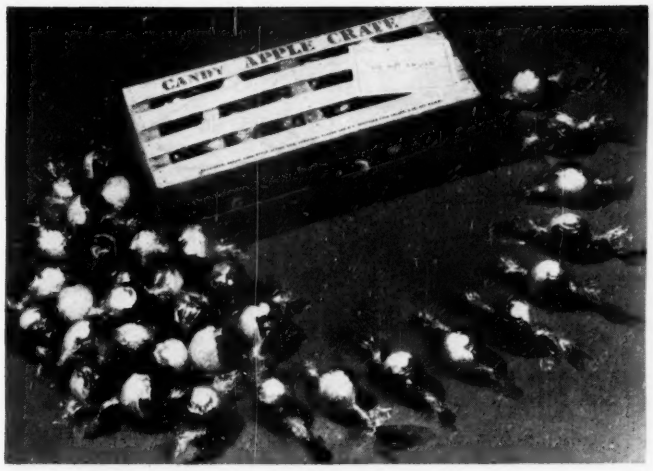

"Crated" Candy Apples A

New packaging idea by Overland Candy Co., division of Leaf Brands, Inc., Chicago, presents candy apples in imitation crates. Yellow and red candy apples, individually cellophane-wrapped, are packed in a miniature, die-cut replica of a fruit crate.

Package is printed to look like real board, and buyers can see the apples through the slats. Special shipping label adds to realism. Broad popularity as a gift item is foreseen.

The tins are lithographed in red, blue, and gold, in a design created by United Tin factories in Holland.

R. Buisman, Inc., parent company of Zwartsluis, Holland, says its product is marketed in a large majority of grocery stores in Holland, Belgium, Germany, Switzerland and England.

Adds Flavor to Coffee B

For imparting added taste to coffee, the product, "Famous Dutch Flavoring", on the European market since 1867, is now being introduced in the U. S. by the American Buisman Co., Hawthorne, N. J.

Tins of the flavoring, which is made of caramelized starch and calcium phosphate, come in two sizes—4 oz. and 1 lb., as illustrated above. One tablespoon to a pound of ground coffee is the company's recommendation. It is stated that use of the product permits the consumer new economy in the amount of coffee used.

Taller, Goes Farther C

The Taylor Reed Co., Glenbrook, Conn., has executed a neat coup, sales-wise, by a clever redesign of its Q-T cake frosting package.

The original package contained enough frosting for an 8-in. cake, but consumer testing indicated that a package having frosting for a 9-in. cake would find a wider market. In the revamping, the product weight had to be increased from 4½ oz. to 5½ oz., necessitating a corresponding increase in sales price. How to retain the market acceptance gained by the smaller package was the problem.

The company decided to convince the consumers visually that the price rise was justified—by placing the accent on the proportionate increase in size of the package. This was done by keeping the same width but reducing the thickness ⅛ in. and then adding a full inch to the package's height.

Photo shows the new package in the four different flavor versions—lime, chocolate, vanilla, and strawberry.

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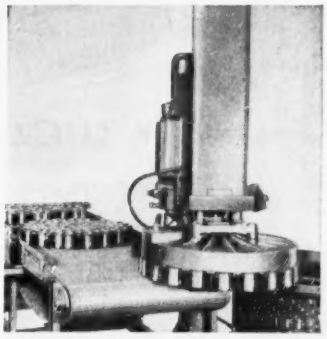

A Cambridge "Gratex" Wire Belt conveying baby food jars to a W. F. & John Barnes Junior Hydro-Magnetic Crate Loader and Unloader. The small-bottomed jars won't tip or trip when shuffled on this closely-woven belt.

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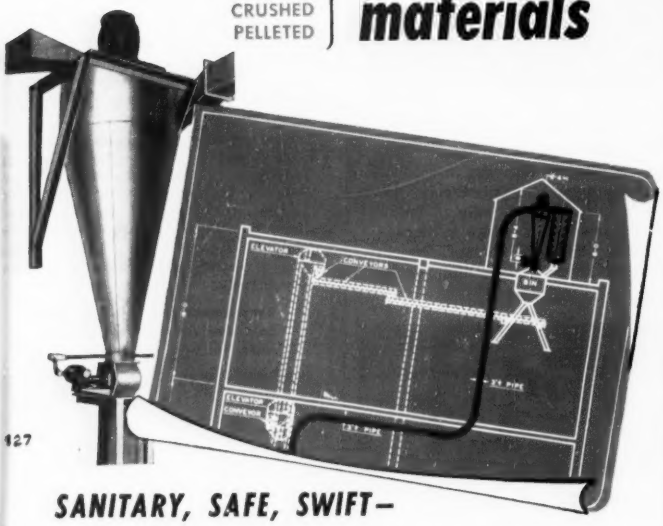

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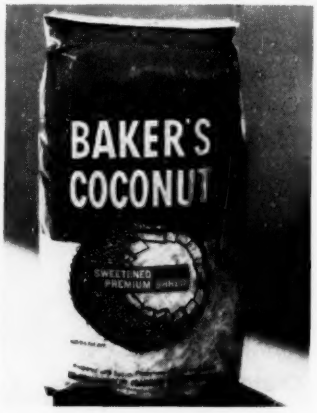

Coconut in Cellophane A

Baker's Div., General Foods Corp., has introduced an 8-oz. cellophane package of shredded coconut to satisfy market demands. Consumer surveys showed a strong interest in a larger size coconut package.

The new cellophane bag is proving popular with economy minded shoppers (two 4-oz. cartons usually cost more) and also with consumers in rural areas who tend to purchase large sizes.

The bag is double cellophane with heat-sealed top and sides.

Party Ice Cream B

Four individual-cup servings of fruit-and-nut nesselrode pudding ice cream are offered in this attractive hostess package. Made by Abbotts Dairies, Inc., Philadelphia, the "Fancy Four" features ice cream garnished with chopped toasted almonds, and a whole red cherry.

The window carton is divided into four compartments by a bleached white paperboard. Each serving is presented

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in a different colored pleated paper cup, housed in a waxed container. The carton itself is the fold-open type.

Budget-Size Pack A

This space-saving, 8-oz. frozen food package for two- to three-person servings will soon be introduced by Pict-Sweet Foods, Inc., Mt. Vernon, Wash.

The new size is designed to offer economy to small family users of frozen foods by enabling them to buy just enough for single-meal servings without leftovers. And the smaller package can be stored more easily in apartment-size refrigerators.

Green peas, lima beans, and mixed vegetables will be the first items offered in this "Pak-et" form.

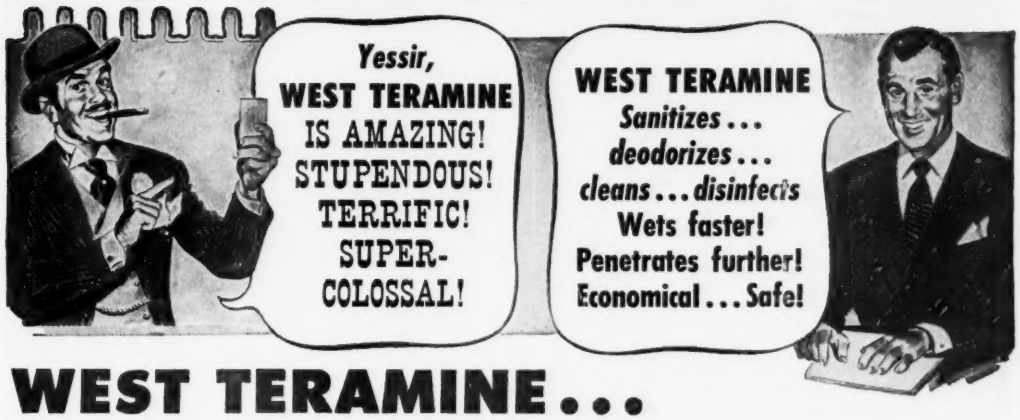
Polystyrene Container B

Pictured above is an 8-in.-dia. polystyrene plastic container with fruit cake inside. Utilizing the advantages of the plastic molding process, the handles were incorporated at little added cost.

Made by Amos Molded Plasties Div., Amos-Thompson Corp., Edinburg, Ind., container's base and top are designed for non-slip stacking on counters. The polystyrene plastic does not absorb odors or affect aroma and taste of food products. It is available in different sizes and in a wide range of colors.

The plastic container has excellent re-use value as a refrigerator dish. It will not corrode, and the handles facilitate lifting. —*End*

He's got the WORDS...We have the FACTS!



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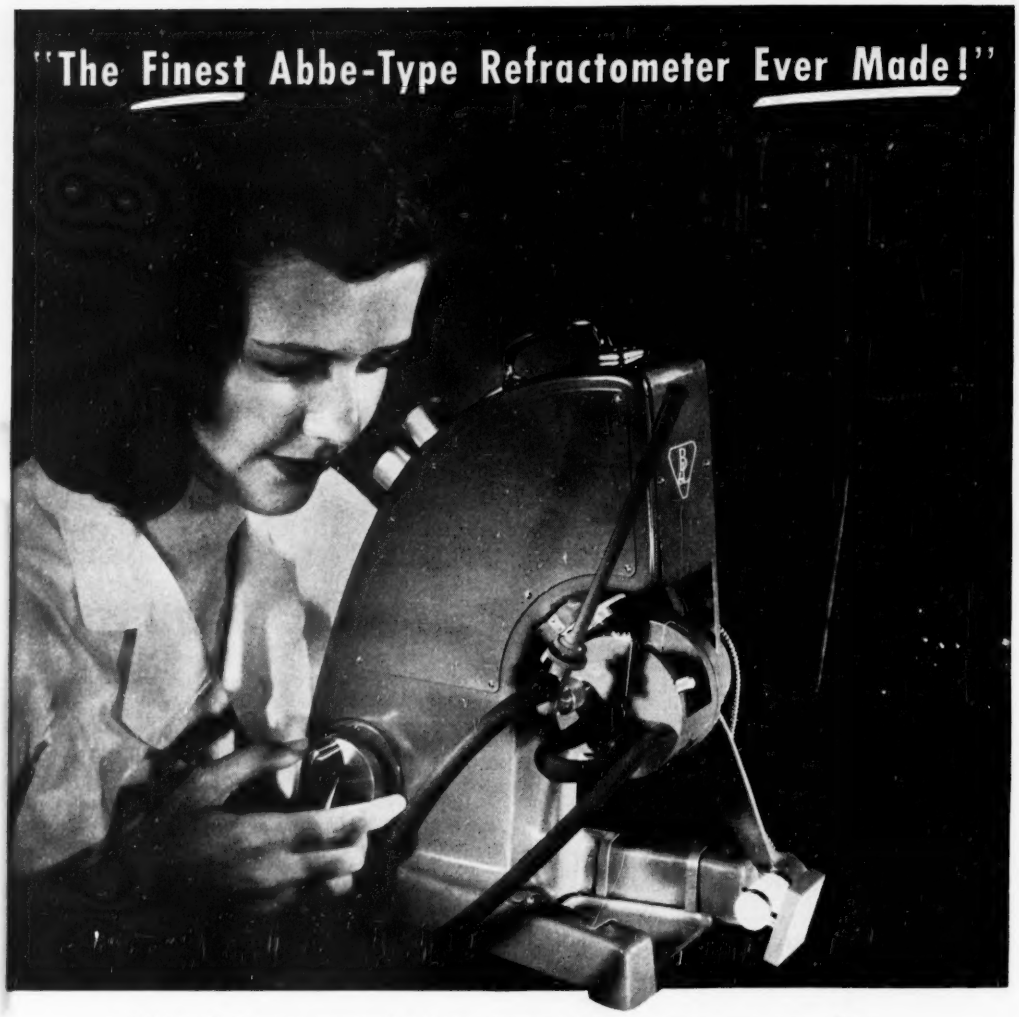

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New Technology

Solvent Extraction of Oil-Bearing Materials Is Greatly Influenced by Soaking Time

Despite the wide use of solvent extraction of vegetable oil-bearing materials, there is no universally accepted concept of the mechanism by which oil transfers from the solid to the liquid or miscella phase. Such information is desirable for better equipment design and process control. A recent study extends our knowledge of the subject, with particular reference to soaking seed flakes in miscella of various concentrations and for different lengths of time preliminary to extraction by percolation.

An oil-bearing seed flake comprises: (1) Non-oil-bearing solids; (2) water; (3) oil, and (4) air space. When the flake is immersed, the air space is filled with solution; and as extraction proceeds, the space orginally occupied by the oil is similarly filled. This void-filling solution is termed "static holdup," meaning that it will not drain from the flake. Under extracting conditions, the oil in the flake is considered to exist in two parts: One the component of the static holdup, and the other the portion of the original oil not yet transferred from the solid to the solution. The latter is termed "undissolved oil." Completely drained extracted meal after desolventizing has an oil content that is the sum of these two parts. This concept has been found useful in treating extraction data for commercial design.

When the extraction of "undissolved oil" was studied by percolation and immersion methods, identical results were obtained for concentration of miscella up to 10 percent oil in commercial hexane. This does not agree with the diffusion concept, but it can be explained on the assumption that the oil is bound in the original substance through a resistance that is slowly soluble.

Extension of the "undissolved oil" concept leads to evaluation of soaking as an aid to extraction. If the oil extracts mainly as a function of time, steeping or soaking should contribute to the transfer of oil from the solid to the liquid phase. Experiments in soaking and extraction by percolation with commercial hexane at its boiling point showed that soaking contributed to extraction and that improvement was greater with longer time. Rate of solution of the oil was relatively independent of the concentration of the extracting solution and was mainly a matter of soaking time. Soaking in any concentration of miscella below 20 percent for half the total extraction time required to reduce the undissolved oil to 1 percent was just as effective as extraction for the entire time with fresh solvent.

Digest from "Solvent Extraction II, The Soaking Theory of Extraction," by H. B. Coats and George Karnofsky, *Journal of the American Oil Chemists' Society*, 51-53, Feb. 1950.

CANNING

Sterilizing of Canned Foods Speeded By New Process

Reduction of from 40–60 percent in time required to sterilize canned food products in conventional retorts is the object of 2 recent patents. Crux of the process is placing materials in cans in such a manner that part requiring the longest sterilizing time is next to outer edge of can. In canning succotash, for example, the 3 ingredients are prepared separately, then filled into cans in separate operations— cream corn first, followed by lima beans (or a mixture of lima beans and corn kernels), then the brine. Cans are immediately sealed under desired vacuum, inverted and retorted. Due to the location of the cream corn on top of the other ingredients, sterilization is said to be greatly speeded, with consequent improvement in the organoleptic quality.

Digest from U. S. Patents 2,502,196 and 97, issued Mar. 28, 1950, on an application dated Jan. 14, 1949, to C. Olin Ball, assigned to The United Products Co., Westminster, Md.

FRUIT PRODUCTS

Changes In Apples During Maturity

Different varieties of apples at identical stages in ripening, show enormous difference in resistance to disintegration. This was the outstanding fact brought out by a 3-yr. study of the changes in quality of 19 varieties of Eastern apples over their entire storage life. Tests were also made for color, flavor and fragmentation at each stage.

A portion of each lot of fruit was frozen immediately after harvesting, and the remainder placed in 32 F. storage. At intervals, successive portions were transferred to 70 F. storage, ripened to a predetermined pressure test and frozen. Successive packs differed by 2-3 lb. in pressure test extending from 15-18 lb. down to 7-8 lb.

Packs were made in 50 percent syrup, without treatment and treated with antioxidants and firming agents. Without treatment, color of Jonathan, Grimes, Yellow Newtown, Winesap, Baldwin (N.Y.) and Cortland (Mass.) was acceptable when packed at all stages of maturity. Northern Spy and Golden Delicious were acceptable when packed in firm stages, and York Imperial, Rome Beauty, Cortland (N.Y.), Baldwin (Md.) and Stayman Winesap were acceptable only when packed in mature state.

Packs made with addition of asorbic acid (1 part in 2,500) to the syrup improved the color of all varieties—least (1 point on the scale of 10) in freshly-picked firm fruit, increasing to 1.5–2.5 with advanced maturity. Immersion of fruit in sulphite solutions, 500–2,500 ppm., improved color but affected the flavor. Addition of 25–100 ppm. to syrup improved color without preceptible bad tastes.

Flavor of packs in general improved

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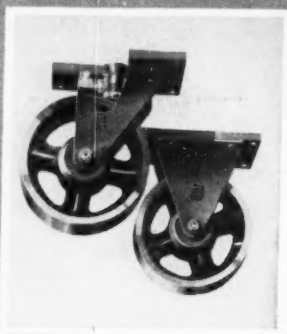

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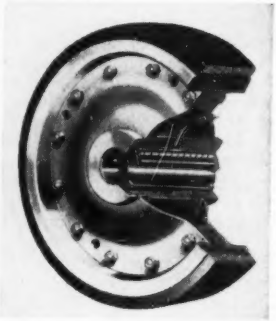

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with increased maturity. However, Northern Spy, Yellow Newtown, Baldwin (N.Y.) and Winesap had good flavor at pressure tests of 18–15 lb. and showed little change as they softened. York Imperial, Yellow Newtown, Baldwin (Md.) and Jonathan did not disintegrate seriously during cooking, even when quite soft. McIntosh and Cortland, however, showed severe fragmentation as maturity increased. Addition of calcium salts was of advantage with varieties showing much disintegration, but in effective concentrations the taste was noticeable.

Digest from "Relation of Storage Maturity of Apples to Quality for Freezing," by J. S. Caldwell, *Report of Proceedings, Conference on Deciduous Fruits*, Eastern Regional Research Laboratory, Philadelphia 18, Pa., held Feb. 6-7, 1950.

STORAGE

Storage Under Refrigeration Improves Green Coffee

Storage of high grade green coffees under refrigeration and controlled humidity during the spring, summer and early fall months is economically practical under many conditions. Such storage preserves more of the color and flavor of the original coffee, and this is carried over to the roasted coffee producing more "snap", better aroma and flavor than the same coffee held in dry storage.

These are conclusions based on experiments in which bags of green coffee were stored at 32-36 F. and relative humidities between 65 and 70 percent for 75, 143, and 208 days. Controls were stored in a dry storage. The results also indicate that refrigeration of roasted coffees, especially when packed in paper bags, is worthy of a trial.

Digest from "The Refrigerated Storage of Green and Roasted Coffee," by C. E. Baker, *Ice and Refrigeration*, Jan., 1950.

BEVERAGES

"Sterile" Beer Produced Minus Pasteurization

Pasteurization of beer is not practiced to a large extent in England and Europe. As an alternative method, use of sterile filtration and filling has been adopted successfully by some brewers. Beer can be made sterile by filtering through asbestos paper pulp sheets of the right porosity, and sterilizing the filter with steam before starting.

Bottles can be rinsed with hot and cold sterile water, sometimes with a

sterilizing agent added, or flooded with 1,500 ppm. of SO_2, while they are still moist. The excess is removed with sterile air jets. Sterile air is also needed in the conveyor to the filler and in the filler itself. Incidentally, the filler should be housed in an air-conditioned room. Spot crowns can be flamed immediately before they are used, or, if crowns without metal spots are used, they can be sterilized with formaldehyde fumes.

When carefully controlled, beer filled into bottles by the sterile technic remains clear and in good condition for 6 months or more, even under shipping conditions through tropical regions. At worst a protein haze develops in about 10 weeks. Control checks on sterility of beer and bottles are necessary for good operation. Samples of beer should be taken at inlet and outlet of the filter and incubated; bottles should be tested by coating their interiors with an agar medium and incubating them.

Cost of the system can be judged from the water and power requirements per 1,000 bottles. For 12-oz. bottles the requirements are: 200 gal. H_2O; 105-110 lb. steam; 4.75-7.50 kw. power, and 2.5 lb SO_2 (when used).

Digest from "Sterile Filling" by G. Osgood, *Brewers' Guild Journal*, Vol. 36, No. 424, 41-60, Feb. 1950.

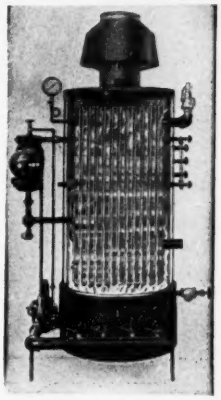
DAIRY

Shrinkage of Ice Cream

The amount of air liberated by ice cream in storage depends on the structural strength and permeability of the ice cream, which in turn are related to its composition. In addition, air-escape is also related to the temperature and pressure to which it is subjected. Ice cream held at 4 F., and subjected to reduced pressures lost air linearly as the pressure fell. At lower temperatures, losses were less for small reductions in pressure, but a sudden increase in air liberated occurred at some "critical" pressure followed by a slower rate of air loss. At —40 to —58 F. very little air escaped even at very low external pressures.

Similar isobaric curves also showed sharp increases in air escaping, at temperatures that decreased with decreasing pressure. The isothermic and isobaric air-loss curves indicate that air is present in ice cream as irregular bubbles surrounded by semi-solid films. As long as the pressure differential is not great enough to fracture the cells at any given temperature very little air escapes. When pressure is decreased or temperature increased to the point where the cell fractures, air is released suddenly and diffuses

WILL YOU HAVE **Steam** FOR PROCESSING NEXT SUMMER?



The KANE Boiler is built to A.S.M.E. specifications, in sizes to 30 H.P.

Will your central steam system be shut-down next summer? If so, act now to insure an independent, *dependable* source of Summer Steam for your processes—we would suggest . . .

the Kane Boiler Package

Each KANE BOILER PACKAGE is carefully considered by us as an "individual" job—from the customer's requirements to the finished unit. And each BOILER PACKAGE is a compact, self-contained steam source that includes: the correctly sized KANE Automatic Gas-Fired Boiler complete with gas burner and controls to maintain required steam pressure; and an M-K-O Automatic Boiler Feed system designed to return condensate and supply make-up water as required for highest operating efficiency.

Engineered Steam at its best with four decades of experience at your disposal—so, send your steam problem to us for study and recommendation.

ENGINEERED STEAM AT ITS BEST

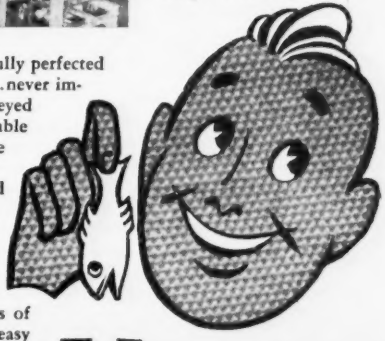
MEARS-KANE-OFELDT INC.

1903-1915 EAST HAGERT STREET, PHILADELPHIA 25, PA.

FOUR DECADES OF AUTOMATIC GAS-FIRED BOILER MANUFACTURING EXPERIENCE

SUPRENE BELTING

Helps Food Stay Wholesome



Suprene Belting has been carefully perfected to help foods stay wholesome...never imparts any taste or odor to conveyed products. Made of tough, durable duck and impregnated with the exclusive Victor "Neoprene" compound, Suprene has proved of inestimable value in the packing, processing and manufacture of food products.

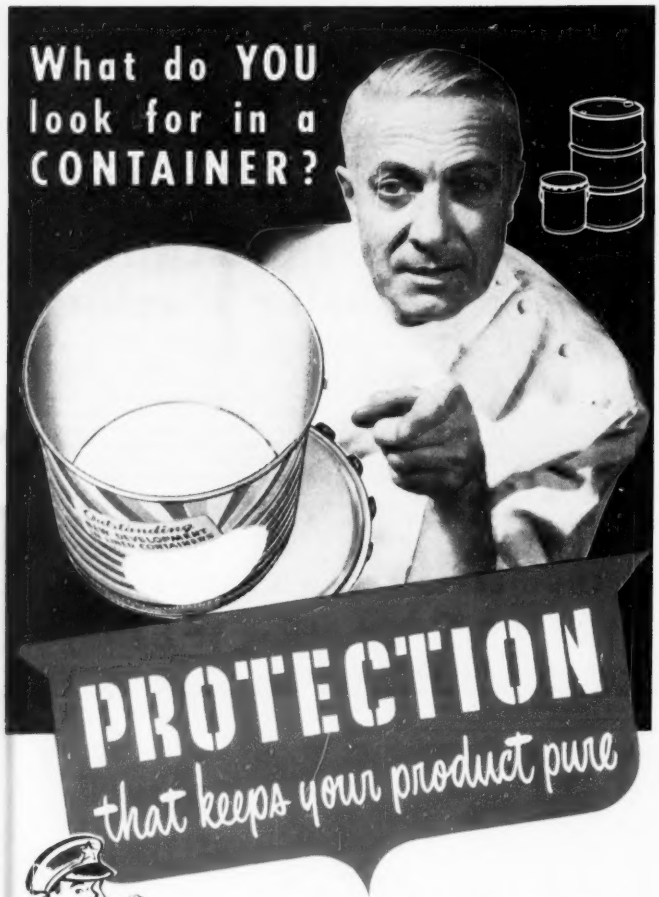
Suprene Belting is not only waterproof, but is also highly resistant to the injurious effects of fats, greases and fruit acids. It is easy to wash with steam or hot water. Specify Suprene Belting for all your conveying needs and be sure of safe, sanitary conveyance for years. Send for bulletin 20—it's free.

6456

Victor Balata & Textile Belting Co.

53 Park Place, New York 7 · 300 W. Hubbard Street, Chicago 10

Factory: Easton, Pa.



— one of 6 essentials you're sure of with Inland Steel Containers

Whatever your special problem may be — there's probably an Inland hi-baked lining to provide perfect protection for your product. And that is "insurance" that means added sales appeal to any customer!

In addition to that, five other factors make Inland your best container source for any product: the *unmatched durability* of steel . . . the *strength* of Inland design . . . the *variety of closures* to meet every need . . . *full-color lithography* that makes every container a "salesman" . . . and selection from a *line that is really complete!*

You're sure of these six essentials when you buy from Inland! Make your selection from our standard line or submit your special problems to our engineering staff.

A-2

INLAND STEEL CONTAINER COMPANY

6532 South Menard Avenue • Chicago 38, Illinois
Chicago • Jersey City • New Orleans

Capacities from 3 to 55 gallons

out of the ice cream, changing its structure and subsequent air-escape rate.

The methods used in these experiments can be applied to shrinkage problems in ice creams of different formulas, since the data are measures of the strength of the lamellae between bubbles.

Digest from "Isothermal and Isobaric Degassing of Ice Cream," by A. Lachmann, E. L. Jack and D. H. Volman, *Industrial and Engineering Chemistry*, Vol. 42, 391-94, Feb. 1950.

Dry Milk Keeps Better When Packed in CO_2

Keeping quality of dried milk can be improved by subjecting it to CO_2 under pressure before sealing in cans. Substitution of CO_2 for N in the accepted commercial procedure—filled cans are evacuated for approximately 1 hr. and *atmospheric* pressure restored with N—also improved keeping quality. But better results were obtained by forcing CO_2 into cans until pressures of 50 lb. were built up, holding at this pressure for 3 hr., then releasing pressure and sealing the cans. Nitrogen, tested under the same conditions was not as effective as CO_2.

Two possible explanations were advanced: (1) That CO_2 displaces more O than N does, and (2) that CO_2 regenerates natural antioxidants destroyed in previous processing.

Digest from "Treating Dried Milk With Carbon Dioxide Under Pressure Improves Keeping Quality," Report of the Chief of the Bureau of Dairy Industry, Agricultural Research Administration, 28-29, 1949.

MEATS AND FISH

Pre-slaughtering Condition Affects Bacon Flavor

Salty flavor of bacon is dependent on factors other than the salt content, to which it may not bear a very direct relation. The "availability index" or ratio of salty flavor score to that of a salt solution of the same concentration expresses this relation.

The index varies from 1.0 to 0.2 and is related to the structures of the muscle tissues and to the pH of the meat. Meats of pH 5.25 after curing had an index of about 0.6, while those of pH 6.20 had an index of 0.25 and were therefore less salty to the taste. Juicy meats have higher indexes, up to 1.0, than the drier meats, but there is no correlation between water content and salty flavor. Condition of hogs before slaughter and their fatness affect the availability of salt used in curing.

British taste for mild cured, lean bacon, and the practice of resting the animals before slaughter, yields a rela-

There's a Century MOTOR To Supply Dependable Power For All Popular Applications

Century motors are available in sizes from 1/6 to 400 horsepower, in a wide range of types and kinds—single phase and polyphase alternating current, and direct current. All of them are ruggedly built to assure top performance throughout a long service life.

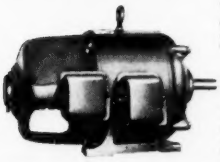
POLYPHASE

Type SC—OPEN PROTECTED—Form J, general purpose motor—meets the needs for most installations where operating conditions are relatively clean and dry. The top half of the motor frame is closed to keep out falling solids or dripping liquid.

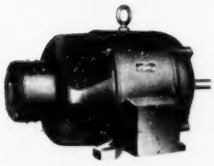
Type SC—SPLASH PROOF—gives the necessary protection where plants must be washed down—keeps water out of the motor even when a hose is applied directly on the frame. Also provides protection against rain, snow, sleet and ice for outdoor installations.

Type SC—TOTALLY ENCLOSED FAN COOLED—protects against dusts, mist or fog detrimental to the vital parts of the motor. The inner frame protecting the motor is sealed to keep out harmful matter.

Type SC—EXPLOSION PROOF protects against atmospheres charged with explosive dusts or gases. They carry Underwriters' label for specific kinds of hazards.



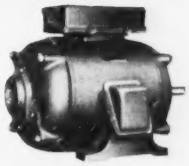
Type SR—SLIP RING—wound rotor motors are suitable for applications requiring low starting current with high starting torque, reversing, or adjustable speed.



Type SY—SYNCHRONOUS MOTORS—suitable for continuous operation at a uniform load for power factor correction.

SINGLE PHASE

Type RS—REPULSION START INDUCTION—single phase brush lifting motor suitable for applications requiring high starting torque with low starting current.



Type CSH—CAPACITOR START INDUCTION—single phase motor suitable when high starting torque with normal starting current is required.

Type SP—SPLIT PHASE, INDUCTION—single phase motors—suitable for light starting duty.

DIRECT CURRENT

Type DN—DIRECT CURRENT MOTORS—suitable for use where direct current is available or its use desirable.

These illustrations are typical of Century's complete line of motors. Others available include gear motors, generators, AC and DC motor generator sets.

Specify the right Century motor for all your electric power requirements.

Popular types of standard ratings are generally available from factory and branch office stocks.

CENTURY ELECTRIC COMPANY

1806 Pine Street
St. Louis 3, Missouri

Century C MOTORS

645

Offices and Stock Points in Principal Cities

Something "FISHY" Going On

BUT FULLERGRIPT SOLVES THE PROBLEM

Scene at Dartmouth Fillet Co. The upper conveyor runs to the skinning and packing Dept. Waste is thrown below into bins emptying onto conveyor that runs along floor to refuse elevator.

It is a problem to keep a rotating power brush from disintegrating, when that brush runs constantly in water and transfers fish "gurry" from a conveyor belt to an elevator. There's plenty of acid in fish "gurry".

At the Dartmouth Fillet Company in New Bedford, Mass., the conveyor system built by A. A. Guilmette reveals the answer to this problem — special Fullergript power brushes. In the construction of these brushes, bass fiber is loop-anchored continuously into a stainless-steel channel, thus forming impervious brush strips. These are mounted by stainless-steel flanges on a drive shaft of the same material.

Instead of going to pieces quickly, the Fullergript brushes have a working life of approximately one year. And at the end of that time only these strips containing the brush material are replaced. There is plenty of time and labor to be saved when the only replacement is the low-cost brush strip.

DO YOU REQUIRE A SPECIAL MACHINE FOR A BRUSHING OPERATION?

You can benefit from our wide experience in designing and building special brushing machines. No obligation to lay your problem before our engineers. Write today.

Similar problems face every branch of the food industry. Learn how you can likewise reduce costs. Write today for our booklet, "Fullergript Power Brushes".

FULLERGRIPT The FULLER BRUSH CO.

INDUSTRIAL DIVISION
3640 MAIN STREET
HARTFORD 2, CONN.

tively acid bacon of pH 5.6-5.7. In U. S. practice, older, fatter hogs, not rested before killing, produce bacon less acid, with an average pH of 6. There is a corresponding difference in availability of salt, so that U. S. bacon does not taste much more salty than British bacon, though its salt content is considerably higher.

Digest from "Salty Flavor in Bacon," by M. Ingram, *Journal of the Society of Chemical Industry*, Vol. 68, 356-59, December, 1949.

Frozen Fish Cakes

Preparation of a fish product that has a unique flavor, is easy to manufacture and to serve, and that may be kept frozen for long periods, is the object of a recent patent.

Using, preferably, a combination of haddock, rockfish and carp, the fish are scaled, cleaned, and the fins removed, then washed several times to remove all loose material. Fish are then thoroughly dried and packed in net bags. Bags of fish are boiled for approximately 45 min., removed from water, and placed on wire racks in a 50 deg. F. compartment for 12-24 hr. to drain.

Meat is then removed from fish carcasses, ground, seasoned with salt, pepper, paprika, onions, garlic, cloves and mustard, and mixed with 8-10 percent of the cooled liquor obtained in the boiling process to form a paste, which is then frozen.

The paste may be filled into conventional sausage casings, or molded into cakes prior to freezing. To serve, the frozen product is warmed, just as is meat sausage or ground meat. Excess liquor may be made into fish soup or chowder.

Digest from U. S. Patent 2,487,957, issued Nov. 15, 1949, on an application dated Oct. 3, 1947, to J. W. Wexler, Silver Spring, Md.

BAKING

Phosphates Inhibit Fat Rancidity

The role of phosphoric acid and some of its derivatives as synergistic antioxidants in fats has been investigated in two-phase systems in order to evaluate their effectiveness in foods containing water as well as fat. Of a number of synergists tested, only citrate and the polyphosphates were sufficiently promising to warrant further investigation. Their antioxidant effect on lard was tested with and without added tocopherol, with the result that the keeping time of the lard containing tocopherol and the synergist was always considerably greater than

Prominent canner finds that 24% more housewives prefer his beef stew with Ac'cent!

CONSUMER TEST again demonstrates how Ac'cent amazingly intensifies the flavor of processed foods—and at low cost

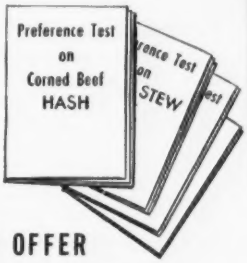
Ac'cent is not a flavoring, not an ordinary condiment or seasoning. It adds no flavor, aroma or color of its own. It brings out—and holds—the *natural* flavors of foods. With Ac'cent you use your own formulas; prepare as usual—just add Ac'cent.

Ac'cent is a 99+% pure monosodium glutamate, a wholesome vegetable derivative. 100 and 200 lb. drums

This manufacturer of a leading brand of beef stew doubted that there was any *practical* way to improve the flavor of his product. However, he agreed to a test of Ac'cent in his plant, in which a bit of Ac'cent was added in the processing of his stew. A sample of this test run and a sample of the regular run were sent to 143 housewives.

130 housewives stated a preference and 62% of them preferred the stew *with Ac'cent*—a majority of 24%!

The complete results of this test, and other similar ones, are on file in our offices. They lead to a conclusion that is important to you . . . that no other single additive can, so easily and economically, *make such a difference!*



READ THIS STRAIGHTFORWARD OFFER

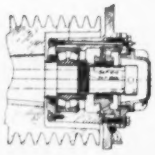
At no obligation to you, we will welcome the opportunity to demonstrate what Ac'cent can do in one of your own foods. Following that demonstration, if a consumer test is considered desirable, we will pay the cost of it, including payment for the materials used. Wire or phone for full information. Amino Products Division, International Minerals & Chemical Corporation, General Offices: 20 N. Wacker Drive, Chicago, Illinois. San Francisco: 214 Front Street; New York City: 61 Broadway. Representatives in Canada: W. G. Clark Co., Ltd., Montreal and Toronto; MacKelvies, Ltd., Winnipeg.

Trade Mark "Ac'cent" Reg. U.S. Pat. Off.

Ac'cent® makes food flavors sing♪

GLOBE ROTO-CUT meat cutters are the standard of the Packing Industry. They produce better meat products at higher speed.

The Ball Bearing and The Spherical Roller Bearing on the cutter shaft of the GLOBE ROTO-CUT machine.



The Globe Company says:

THIS LUBRICANT INCREASED BEARING LIFE FROM 2 WEEKS TO 2 YEARS

"After we had quite a few of our large high speed ROTO-CUT meat cutting machines in actual production operation, the ball and spherical roller bearings on the cutter shaft gave us serious trouble. Some bearings did not last even two weeks.

"In an effort to correct the difficulty, we contacted a number of the large lubricant manufacturers. We tried all the lubricants their engineers recommended without the slightest success. We checked with the manufacturers of the bearings who assured us that the bearings were not overloaded. The trouble was the condition that prevails throughout the meat packing industry, animal acids and moisture, a combination most harmful to ball and roller bearings.

"Then, Ball Bearing LUBRIPLATE was called to our attention. The results we obtained from its use were most gratifying and amazing. We have had these ROTO-CUT machines lubricated with Ball Bearing LUBRIPLATE in continuous operation, twenty-four hours a day, three hundred days a year for over *two years without a single bearing replacement.* We now use LUBRIPLATE for factory lubrication and recommend it to our customers for use on practically all the equipment we manufacture."

THE GLOBE COMPANY
Frank J. Bilek (Chief Engineer)

YES, LUBRIPLATE LUBRICANTS ARE DIFFERENT! They reduce friction, wear and power consumption . . . prevent rust and corrosion and last longer than ordinary lubricants. LUBRIPLATE Lubricants are available from the lightest fluids to the heaviest density greases. There is a LUBRIPLATE product best for your every lubrication need. Write for case histories of the use of LUBRIPLATE in your industry.

LUBRIPLATE DIVISION • Fiske Brothers Refining Company
Newark 5, New Jersey • Toledo 5, Ohio

DEALERS EVERYWHERE • SEE YOUR CLASSIFIED TELEPHONE BOOK

LUBRIPLATE the Modern Lubricant

the additive effect of tocopherol and synergist separately. When arranged in order of their effectiveness, it was apparent that the degree of polymerization was important in determining antioxidant activity of the polyphosphates. Antioxidant activity increased from pyrophosphate through tri and "heptaphosphate," and finally to the most active hexametaphosphate and Maddrell's salt. Citrate compared favorably with tri and pyrophosphate in antioxidant activity. The polyphosphates also inhibited rancidity in the presence of added Cu and Fe, but did not eliminate the catalytic effect of the metals. Antioxidant activity of phosphates in dry fats did not parallel their activity in aqueous fat systems.

Digest from "Phosphates as Synergistic Antioxidants," by B. M. Watts, *Journal of the American Oil Chemists' Society*, 48-51, Feb. 1950.

SANITATION

DDT In Impregnated Sacking Is Transferred To Foods

When finely divided, high fat foods are packed in bags heavily impregnated with DDT and these bags are roughly handled and stored for long periods, then large amounts of the insecticide are absorbed by the foods.

Experiments were made on Argentine flour and soy flour and peanuts packed in cotton bags, and on English wheat and cacao beans in jute bags, to determine the rate of DDT absorption from them over different storage periods. Soy flour absorbed about 204 ppm. of DDT in 4 months from cotton bags treated with 1 percent DDT, but took up 631 ppm. from bags treated with a 5 percent solution. And dropping of the bags 20 times from a height of 5 ft. onto a concrete floor increased the absorption to 228 ppm. and 964 ppm., respectively. Peanuts absorbed 72 ppm. DDT in 4 months and 111 ppm. in 13 months from bags treated with 1 percent DDT. For 5 percent solutions, absorption was 111 ppm. in 4 months; 399 ppm. in 13 months.

At the tolerance limit allowed in England—7 ppm. for DDT in foodstuffs—whole seeds may be stored safely for a year in bags treated with 1 percent DDT; wheat, whole and unprocessed, may be stored for a year in 5 percent treated bags. Oily, ground, broken, or decorticated seeds cannot be stored safely in DDT-treated bags for even as short a period as 4 months.

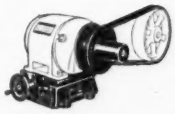
Determinations were made by dehydrochlorinating the foodstuffs with monoethanolamine, followed by electrometric titration of the chloride with silver nitrate. DDT is extracted from

"..... and then, at this point, we installed Reeves Speed Control."

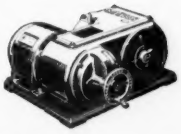
THE 3 BASIC REEVES UNITS

VARIABLE SPEED TRANSMISSION for providing infinite, accurate speed flexibility over a wide range—2:1 to 16:1. Sizes—fractional to 87 hp.

VARI-SPEED MOTOR PULLEY provides an instantly variable speed drive within 4:1 ratio for any constant speed motor. Sizes to 10 hp.



MOTODRIVE combines motor, speed varying mechanism and reduction gears in single unit. Speed variations 2:1 to 6:1 inclusive. Sizes to 20 hp.



Applied to your production machines, accurate, instantly variable REEVES Speed Control will produce results—*right now!* You'll see *immediate,* dollars-and-cents improvement in rate of production, quality and uniformity of product . . . *immediate* reduction in time and material loss. All because REEVES Speed Control, by providing the correct speed for every operation and every operator under every changing condition, enables both machines and men to work at top efficiency. More than 265,000 REEVES installations encompassing virtually every industry prove this statement *beyond the shadow of a doubt!* Prove it to yourself. Install REEVES on existing machines—demand it on new ones. Write for the new, 132-page catalog covering in detail the complete REEVES line. Ask for Catalog No. FD31-3N.

REEVES PULLEY COMPANY • COLUMBUS, INDIANA

Recognized Leader in the Specialized Field of Speed Control Engineering

ACCURATE • VARIABLE

Reeves Speed Control

GIVES THE RIGHT SPEED FOR EVERY JOB!

For Blending or Proportioning Food Mixes

For continuous, high accuracy feeding of fine, dry materials

For constant feeding accuracy, long-lasting dependability, and simplicity of operation you can't beat Omega Disc Feeders. They feed by volume fine, dry material such as cocoa, powdered milk, flour, powdered eggs, or vitamin concentrates. Feeding rate is infinitely variable over a 100 to 1 range.

Mounting the Feeders on scales provides a check on the weight actually delivered.

Model 47 has a maximum capacity of 5 cu. ft. per hour. Model 46 is for smaller quantities and handles from 1 to 1500 cu. inches per hour. Omega Disc Feeders are "standard equipment" for vitamin enrichment in the flour milling industry. For complete information and Bulletin 55-F1, write Omega Machine Company (Division of Builders Iron Foundry), Providence 1, R. I.

Omega manufactures a complete line of volumetric and gravimetric feeders for dry materials and for gravity feeding of liquids and solutions:

Belt-Type Gravimetric Feeders
Loss-in-Weight Gravimetric Feeders
Universal Feeders
Precision Solution Feeders
Disc Feeders
Rotodip Solution Feeders
Rotolock Feeders
Dust Collectors
Bucket Elevators

THE LAST WORD IN FEEDERS
OMEGA

the food with benzene in a Soxhlet extractor. Recovery is about 99 percent, and the limit of reliability of the method is about 0.1 mg. DDT in the aliquot taken.

Digest from "The Transfer of DDT to Foodstuffs from Impregnated Sacking," by D. E. Butterfield, E. A. Parken, and M. M. Gale, *Journal of the Society of Chemical Industry*, Vol. 68, 310-13, Nov. 1949.

MISCELLANEOUS

Suspending Power Of Carrageenin

The dried hot water extract of Irish moss, carrageenin, finds wide use in the food industries, particularly the dairy industry, as a suspending agent.

Effectiveness of a carrageenin preparation as a suspending agent is related to the concentration required to give milk a viscosity of 15 centistokes at 50F. Casein-carrageenin gel formation seems to be responsible for the viscosity effects since four to five times as much carrageenin is required to reach the same viscosity level in whey as in whole milk.

For measuring the suspending power of a carrageenin preparation in milk, its viscosity in an aqueous 0.05 N NaCl solution may be used. The correlation coefficient between viscosity and suspending power is not quite so large for NaCl solutions—0.91—as it is for milk—0.98—but measurements can be made at once, whereas milk solutions must be refrigerated for a standard time before determining their viscosity.

Digest from "The Suspending Power and Viscosity of Carrageenin," by R. C. Ross and W. H. Cook, *Canadian Journal of Research*, Vol. 27F, 323-37, Sept. 1949.

Pectin From Sugar Beets

Extracted pulp of sugar beets can be a source of pectin which, although not equal to fruit pectin for jellies, can be adapted to other uses.

Each ton of beets processed for sugar leaves a residue of about 80 lb., of which 20 lb. is pectin. This may be recovered by extracting the pulp for two days with 20 times its weight of warm water acidified with HCl. The water is then drawn off and filtered. The pectin is precipitated with aluminum sulphate, the precipitate washed, then redissolved and the inorganic salts removed by treatment with an ion exchange resin. The purified solution is then evaporated at low temperature in vacuum stills and finally spray- or vacuum drum-dried.

Digest from "Pectin From Beets Forecast by Chemists," paper presented by P. T. Miller, U. of Wyoming, at ACS meeting, Atlantic City, N. J., Sept. 21, 1949. —*End*

It's A SURPRISE PACKAGE

When it comes to low-cost painting, Barreled Sunlight is really a surprise package . . . *to those who have never used it before.*

We agree, Barreled Sunlight costs more per gallon *in the can.* But is *that* important? No! . . . not by a long shot . . . not when you figure paint in terms of what it costs you *on the wall.*

That is why we ask cost-conscious men to compare *thoroughly* Barreled Sunlight with any other brand of paint. Just take a gallon can of each. Thin according to directions and see how much *more* paint *ready for the brush* you get from a can of Barreled Sunlight. Then apply each to a wall. Note the extra yardage you get from Barreled Sunlight and how brighter, cleaner it looks after drying. And, *because labor represents 80% of the total cost of a painting job* see how much *less time* it takes to apply Barreled Sunlight properly.

With a fair test like this, you'll soon see that for effective, *economical* painting, Barreled Sunlight is the "Surprise Package," the paint that works best for less . . . less paint, less labor, less cost for the finished job.

Talk it over with our representative. Write and he'll gladly call.

U. S. GUTTA PERCHA PAINT COMPANY
37-E Dudley St., Providence, R. I.

Barreled Sunlight *Paints*

In whitest white or clean, clear, pleasing colors, there's a Barreled Sunlight Paint for every job

IT ALWAYS COSTS MORE NOT TO PAINT!

AMERICAN TEXTILE MACHINERY EXHIBITION ATLANTIC CITY MAY 8-12, 1950

Booth 262

"HOTTER, SOONER" Saves YOU MONEY

Yarway Impulse Steam Trap with new stainless steel body.

Yarway Impulse Steam Traps get equipment hot and into production *faster.* Extra profits!

Then they keep it *continuously* at peak operating temperatures for maximum production. More extra profits!

What's the reason for *hotter, sooner?* Just this. When steam is turned on, Yarways open wide, discharging the air and condensate *in a hurry* —closing only when steam arrives. Then, when operating temperature has been quickly reached, the little valve (only moving part) literally *floats on the load* . . . discharging heat-retarding condensate as soon as it forms instead of waiting for quantities to accumulate. Thus equipment is held at peak operating efficiency.

Other economical features of Yarway traps—minimum maintenance, easy installation, low initial cost.

More than 600,000 Yarways have already been installed. Sold by distributors throughout the world.

Try a Yarway today . . . standardize on Yarways tomorrow.

YARNALL-WARING COMPANY
127 MERMAID AVENUE, PHILA. 18, PA.

Nest of Yarway traps installed with Yarway Strainers on cloth dryer. Note small space required.

Stainless Steel Body

YARWAY IMPULSE STEAM TRAP

AMI Reports on Meat Research

Spotlighted are sanitation, microbial activity, and biological food poisoning, as well as nutrition

Highly successful with its first research conference last year, the Council on Research of the American Meat Institute repeated March 23 and 24 on the campus of the University of Chicago. The program consisted of symposia on nutrition and biology in relation to meat and meat products, also a session on subjects of general interest to meat processors.

In attendance were 300 invited technologists, executives, plant operators, and research workers representing meat packing companies, government agencies, and universities engaged in studies and research projects pertaining to meat packing and processing. H. S. Mitchell, director of research, Swift & Co., and chairman, Council on Research, American Meat Institute, presided at the opening session.

All papers presented reviewed recent research data. Here are some of the discussions that pertained directly to packers' problems:

No Fat Energy

M. I. Grossman, University of Illinois College of Medicine, Chicago, stated that fats are not essential in the diet for energy purposes. They are a desirable item of food because they add palatability and attractiveness to the diet. Whether unsaturated fatty acids are essential has not been established. Studies with ordinary mixed diets show no evidence of any significant differences in the digestibility or nutritive value of the common food fats such as lard, hydrogenated vegetable oils, or butter. Feeding tests show fat to be the most difficult foodstuff to digest and that certain hormones assist in its digestion.

The biological symposium was presided over by P. P. Aldrich, Krey Packing Co., St. Louis, Mo., and dealt with sanitation, microbial activity and biologic food poisoning.

L. B. Harriman, Armour and Company, reviewed quaternaries and their applications in the meat packing industry. Comparisons were made in respect to chlorine. Advantage of chlorine were cited to be: (1) Low cost, (2) resistance to water hardness, (3) volatility of residue. Quaternaries as a class cost about four times as much as chlorine, must be selected critically for intended use because of their instability to water hardness, should be used as recommended by manufacturers because toxicity is variable and data not complete, and are stable at cleaning temperatures.

H. O. Halvorson, University of Illinois, reported that there is very little information on or about the mechanism of spore germination. In general, germination is favored by environmental conditions which favor growth of vegetable cells, such as temperature, pH, osmotic pressure, and nutrient media composition. An important point is dormacy, which is thought to result from the presence of inhibitors to growth. Unsaturated fatty acids show inhibitory effects, but can be counteracted by starch. Other compounds can act as inhibitors, but have not been identified. Some are thought to result from growth of vegetable cells and others by the action of enzymes secreted by the spores. Still other compounds are thought to be stimulants for germination, but they have not been studied to any great extent.

James B. Evans, American Meat Foundation, stated that bacteriological examination of foods suspected of causing food poisoning is complicated by the widespread opinion that staphylococci of widely differing physiological characteristic are capable of producing enterotoxin. Studies show, however, that enterotoxin production is limited to members of a well-defined and homogenous group of staphylococci. All enterotoxic strains studied were coagulase-positive (clot citrated rabbit plasma), but not all coagulase-positive strains produced enterotoxin. Since enterotoxin is much more resistant to heat than the organism producing it, conclusive proof that a given food item causes illness depends upon feeding it to several humans under test-conditions with ill effects.

D. M. Doty, American Meat Institute Foundation, University of Chicago, reviewed the role that enzymes play in the meat packing industry. The activity of these naturally-occurring, specified heat-labile proteins is influenced by such factors as acidity, presence of specific activators or inhibitors, temperature, ultra-violet radiation, mechanical disintegration, and enzyme or substrate concentrations. These factors require careful consideration in the control of enzyme-catalyzed reactions. Enzymes in the moist state are readily destroyed by heat. Oxidative enzyme changes in meat tissue is accomplished through removal of hydrogen or through the addition of oxygen.

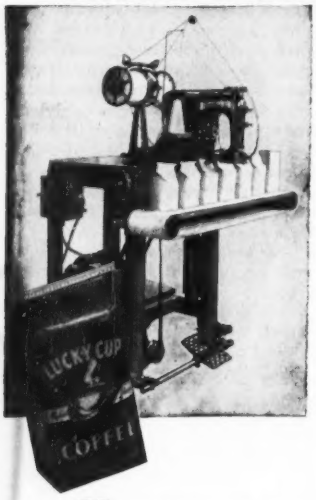
Recommendation was made that a company should not attempt commercial production of enzyme concentrates unless it has trained and experienced technical personnel as well as adequate supply of source materials and processing facilities.

Frozen Meats

R. L. Hiner, U. S. Department of Agriculture, Beltsville, Md., reviewed results of experimental studies on freezing and freezer storage of fresh meats to show that proper control of the factors involved gave products that are practically the same after freezing as they were before. Declaration was made that freezing improves the tenderness of beef, pork, and lamb. The temperature of freezing and the number of days aging determine the tenderizing effect. Explanation was made on the basis of the effect of fast freezing upon the muscle fibers through formation of small ice crystals within the muscle fibers. Experiments showed that the tenderizing effect found in freshly frozen meats disappeared during long-time storage. Vacuum-packing tests showed an increased storage life. Non-vacuum-packed storage resulted in some weight loss, oxidative changes in the fat, and only small change in chemical analysis of lean tissue. Meat in vacuum-packed storage at 18 deg. F was similar at the end of 48 weeks to that stored under atmospheric pressure at 0 deg. F. Frequent alternating of storage room temperature from 0 deg. F. to 16 deg. F resulted in meat no better than that stored at constant higher temperatures. Drip during thawing appeared to depend on temperature of freezing and extent of fiber splitting. Storage of pork at 0 deg. F. and 15 deg. F. resulted in some loss in the growth-promoting value of protein.

W. O. Lundberg, Hormel Institute, University of Minnesota, Austin, said the best hope for improving the economic status of animal fats in the near future rested in their utilization in

for closing
PAPER BAGS



Where food products are packaged in paper bags—from 1 lb. to 25 lb. size—the closure should be firm, tight, eye-appealing, inexpensive and easy to open. The ideal closure is the Union Special *"Dubl-Tape"* Closure. Producing this closure is the final step in mechanized packaging and can best be done with the Union Special 60000 D sewing head. Mounted on the popular Style 21800 N portable, table-type, bag closing machine, this is considered *essential equipment* by many producers of dry foods.

Style 21800 N machine includes a power-driven conveyor adjustable vertically to accommodate different sizes of bags. Control is by floor treadle and the unit may be operated from a sitting position. Ask for recommendations on your particular problems. Literature on request. UNION SPECIAL MACHINE CO., 450 N. Franklin St., Chicago, Ill.

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oleomargarine, improved types of shortenings, and other products in which vegetable oils are now largely used as raw materials. The long range approach lies in the development of new products and new uses for animal fats by largely making use of the reactivity of the carboxyl group and the unsaturated linkages of fatty acids. Stress was put on the importance of basic scientific research to the future of animal fat products.

Bakers Talk About Costs

"Your work has only begun," was the challenge M. Lee Marshall, chairman, board of governors, American Bakers Association, gave members of the American Society of Bakering Engineers at the opening of its 26th annual meeting in Chicago, in March. He summarized the problems of the baking industry to be: Mounting costs, substitution of other foods for bakery products in the human diet, and need for continued improvement in quality. He also noted that the price of bread stays consistently below the average cost of living or the cost of other foods and that the consumer is getting more for his money in bread today than he did ten years ago, in terms of average hourly wages—10 loaves per hourly wage today as compared with 7 loaves in 1938. Conviction was expressed that increasing bread prices will not solve the industry's economic problems. The answer is to find ways and means of making the same high quality products with the same ingredients at a lower cost.

Fred Weberpals, H. C. Bohack Co., Brooklyn, N. Y., emphasized that the government support floor under ingredient costs, high and increasing labor costs, and competition within the industry coupled with downward trend in consumer price level are the three factors that make costs so important to the baking industry. He declared, "Tomorrow's profits will be found in today's wastes."

Peter G. Pirrie, *Bakers Weekly*, New York City, discussed costs in terms of production control as represented by ingredient costs, mechanization, and equipment maintenance. His study of the baking industry convinces him that the profit margin depends more on cost variables—ranges in cost—than on any other factor and that control over these variables lies in cutting wastes rather than in changing the formulas. He identified some of the variables to be: (1) Overweight of dough per loaf due to worn or improperly adjusted divider, (2) loss of ingredient materials during shipment and storage, (3) loss of dough weight by evaporation, (4) inefficient fuel consumption in ovens, (5) use of superheated steam in oven instead of wet steam that costs 1/5 as much to make in terms of fuel costs, (6) loss of minor ingredients during handling and weighing or measuring, and (7) lack of inventory control.

Recommended means of controlling these variable costs were: (1) Daily cleaning of machinery, particularly the divider, (2) keeping divider well-lubricated during operation and working surfaces protected against corrosion when idle, (3) keeping cost records on major ingredients—actual cost records, not merely purchase prices, (4) installation of air conditioning in fermentation rooms, (5) systematic scheduling of production to eliminate gaps in oven use, (6) elimination of use of super-heated or saturated steam in oven when wet steam can be used, (7) keeping minor ingredients in enclosed area under supervision of a stock man and issue only on written requisition, (8) maintenance of a daily and continuous inventory, and (9) keeping records such as salesmen order sheet, bake-shop order, dough sheet covering time, temperature and dough weight, shop record including weight record of minor ingredients used, production manager's record showing totals from bakeshop orders, dough sheets, shop records.

Arthur Cordes, William Freihofer Baking Co., Allentown, Pa., discussed control of labor costs. He dealt with such factors as: (1) Scheduling delivery of ingredient materials and supplies so that labor to receive and store might also be scheduled, (2) scheduling work in production department in accordance with oven capacity to avoid over-crowding and gaps in production flow, (3) scheduling definite personnel in position for each operation and for each unit of equipment, (4) maintenance of continuous or straight-line production flow, (5) checking overtime diligently and daily, (6) keeping a pay-roll record and a production record for individual workers, (7) keeping a weekly production record, and (8) keeping a weekly production profit and loss record. He favors higher wages in bakeries if higher quality labor and increased production per worker can be obtained.

Martin Eisenstaedt, American Stores Co., Philadelphia, discussed the advantages of always having the produc-

tion superintendent as a member of the sales planning committee so that both the production and sales departments will understand each others problems and of the need for flexibility in production and sales programs to permit competitive changes without sacrifice in quality of products.

John A. Wagner, Baltimore, Md., recommended that plants should operate under systematic supervision of a sanitarian with weekly inspections by management, that inventory control should be practiced with a short inventory of only three weeks in summer and four weeks in winter, that flour should be inspected upon receipt and returned to railroads for fumigation if car shows indications of insect infestation or to flour mill if the flour inside the bag is infested, and that flour handling equipment should be thoroughly cleaned and spot-fumigated weekly. His practice requires that the individual operator be held responsible for cleaning of equipment and production area used by him, that the floor under equipment units, such as mixer, be vented to sewer to permit wash downs without leaving floor wet, that an open house for visitors be held weekly, that a paint color scheme be followed to emphasize cleanliness, and that a sanitation notebook with a cover be hung at the time clock for employees to call the sanitarian's attention to housekeeping or equipment that, in their opinion, should be corrected.

Rope and Mold

Elmer F. Glabe, Food Technology, Inc., Chicago, reviewed the use of rope and mold inhibitors in foods and evaluated their effectiveness and effects upon the flavor of bread and dough fermentation. He included vinegar, monocalcium phosphate, calcium and sodium proprionates, and sodium diacetate. He stressed the importance of these inhibitors being active against rope and mold without being inhibitive to yeast and of their being effective in low percentages to comply with the maximum limits set by Federal Food and Drug Administration. Quantitative data were reported on studies made to determine the identity and percentage of those that kill rope and mold growths, that depress loaf volume or slow down gas production, and that are affected by the mineral constituents of the ingredient water. Their use in cake was declared to be critical, if not questionable, because of cake batter sensitivity to acidity. Their use in bread is regarded as an established practice, which is likely to be continued. Declaration on label appears to be a likely requirement but is dependent on official declaration of standards for bread.

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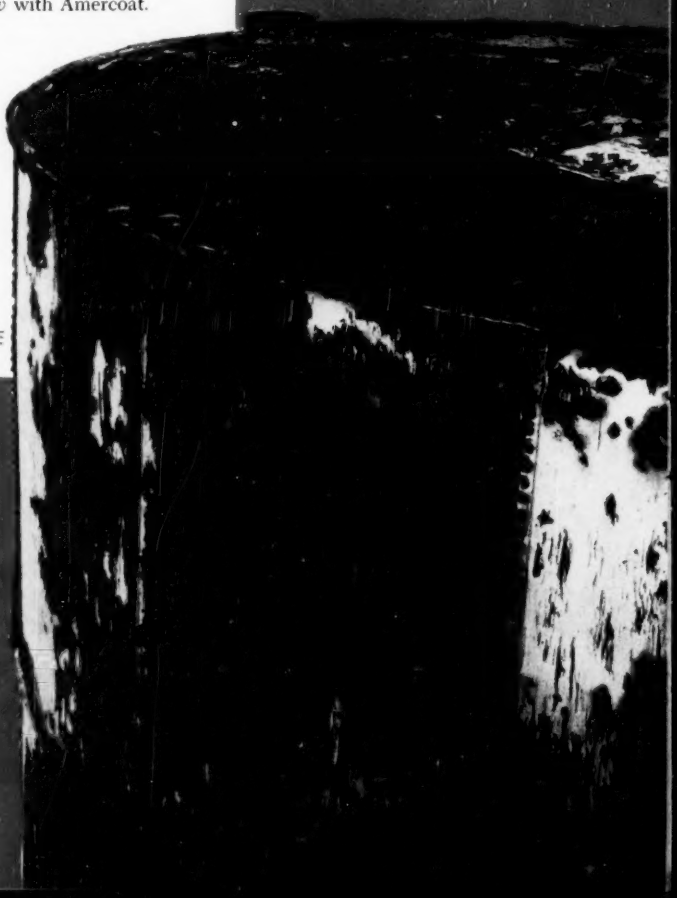


JUNKED BEFORE ITS TIME—

This costly storage tank, due to failure of a conventional coating, served but half its life expectancy. The result—thousands of dollars for replacement, interrupted operations and needless waste.

Food Industry News

Grower Support Profits Are Safe At Least for One More Year

Despite all the bad publicity on potatoes and the ever-growing surpluses that are bulging government storehouses, Congress will do nothing to change basic farm price support legislation.

The main reason: "Don't rock the boat, the farm vote has to be handled with care in this election year." So the present program will be unchanged for 1950 crops—and, in fact, is unlikely to be changed for 1951 crops. The new Congress that comes in next January—regardless of its political complexion — cannot act quickly enough to change price supports before farmers begin planting their 1951 crops. And Congress does not change the law in the middle of the crop year.

Consequently, it is almost a certainty that the first crops that could be affected by any change in the price support programs will be those planted for 1952 harvesting.

Adding More

Farm bloc Congressmen, however, have been busy bolstering the present program. They passed a law to ease an acreage cut-back that had been previously applied to peanut and cotton growers. The same law held off any effective production controls on this year's potato production—the price support program that has been most revealing of the defects of the present legislation. There are chances of another potato fiasco this summer and fall.

Another important piece of legislation is the addition of $2,000,000,000 to the spending-lending kitty of Commodity Credit Corp., the agency that does the price-support buying for the Department of Agriculture. CCC has tied up more than $4,000,000,000 of its $4,750,000,000 bank account in loans and inventories. So it came to Congress for more money. Without this addition to its funds, CCC officials noted, there could be no price support this year for several commodities that have been supported, but which are not required by law to be supported.

Secretary of Agriculture Brannan allowed the price support program for hogs to lapse at a time when it might otherwise have become operative, just to make sure that corn belt Congressmen, and others, understood the importance of the money bill.

At the same time, President Truman told Congress in a special message that it should not tinker around with the present price support program—but should get busy and pass something like the Brannan Plan.

Truman, farm Congressmen, and city Congressmen alike recognize that farm subsidies cannot continue on the present scale for many more years. The politicians know they have voted themselves—and the public—over a barrel on price supports, and they are hunting for a way out.

What they want, of course, is a scheme that will cut the cost of price supports—or at least hide them—and at the same time keep farm prices high and the farmers happy.

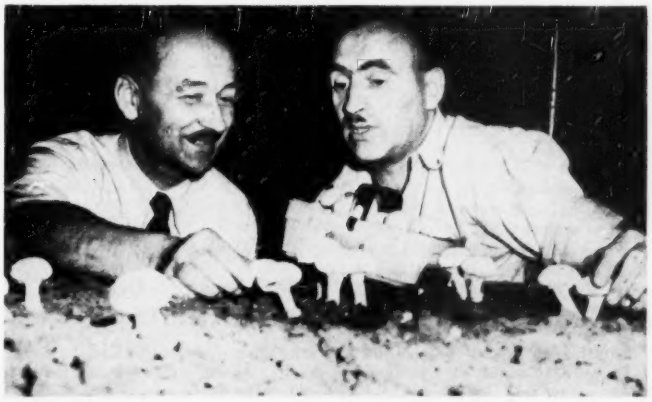
The Administration has the Brannan Plan as its scheme for doing just this. Brannan's idea promises farmers higher supports than they are getting now, and lower prices to the housewife. He would do this by paying the farmer direct to make up the difference between the fall market price and the guaranteed price.

The Labor unions and some city Congressmen like the Brannan Plan—and the Democrats have a display of polls and other indicators showing that more farmers are turning to it. But in the year since Brannan recommended his plan to Congress, it has got nowhere, either with the legislators or with the country as a whole.

The Republicans have no farm plan as yet to run against the Brannan Plan—but they are toying with one. It is designed to fight fire with fire. It would guarantee the farmer just about the same high prices he is getting now—but the costs would be paid out of processing taxes levied on the first processor of the commodity. This processing tax was tried before but was ruled unconstitutional back in the 30's. Present promoters of the idea say they can now get around this.

Give Baking Equipment

Recent contributions toward equipping rooms at American Institute of Baking's new building in Chicago include: Control laboratory by Anheuser-Busch, Inc.; research laboratory No. 3 by Merck & Co.; entomological laboratory by A. R. Fleischmann, vice-president of Standard Brands, Inc., New York City; board of directors and chairman's room by Allied Trades of Baking Industry; student classroom No. 1 by Paniplus Corp., Kansas City., Mo.; student classroom No. 2 by I. E. Caster, president, American Institute of Baking; electric clock system by Frank Bamford, *Bakers Weekly;* and students' lounge by American Institute of Baking Alumni Association.



Bombed-Site Farm

In a London back street, a bombed site is serving these two former Polish officers as a mushroom farm. They have just harvested their first crop. Surplus air-raid shelter bunks proved to be just the thing for use as mushroom beds. (Combine)

It's Still Turkey

Eviscerated and properly carved, these turkeys are bound up into rolls on a turkey ranch, near Santa Rosa, Calif., and marketed as "Turkirolls." They can be cooked whole or in part by consumer. (Wide World photo)

Food Company Statements Show Higher Earnings

Earnings among food companies were greatly improved in most 1949 annual statements, even though in some cases sales volume had declined.

General Foods Corp.'s earnings were the largest in its history, with the net rising to $27,445,941. Net earnings in 1948 were $24,555,752. Sales also reached a new high—the 16th consecutive year in which sales topped any previous year—amounting to $474,637,193. This compares with net sales of $463,336,031 the year before.

Clinton Foods, Inc., also reached its greatest sales volume and highest earnings during 1949. Net earnings showed a tremendous jump from $853,652 in 1948 to $3,912,712 in 1949. Net sales in 1949 totaled $73,174,962.

Standard Brands upped earnings in the face of dollar sales decline. Net sales were $262,964,193 in 1949, compared with $283,616,094 the previous year. Consolidated net earnings, on the other hand, were $8,189,138 in 1949, as against $7,277,727 in 1948.

Both sales and earnings dipped slightly for National Biscuit Co., last year. Net sales dropped to $294,420,391 from the previous year's $296,250,631. Net earnings were $21,676,903, last year, against $22,713,736 in 1948. Adjustments in accounting, however, reduced 1949 earnings by approximately $2,000,000.

Sunshine Biscuits, Inc., showed gross sales of $104,551,926 in 1949, compared with $109,122,549 the previous year. Net earnings, last year, were $7,832,420, against $6,923,284 in 1948.

National Dairy Products Corp. revealed net sales of $897,675,545, a sizable drop from $986,403,723 taken in the previous year. Net earnings in 1949, however, were $33,258,853, compared with $25,558,546 earned in 1948.

Borden's also showed a decline in net sales and an increase in earnings. Sales in 1949 came to $613,763,267, which compares with the 1948 total of $649,592,375. Net income rose to $21,890,479 from $19,179,427.

Creameries of America, Inc., showed net earnings of $1,008,296 on net sales of $28,984,570. This compares with 1948 earnings of $862,843 on sales of $38,810,916.

Loft Candy Corp., following the down-up pattern, reported sales of $12,174,429 in 1949, compared with $13,334,369 in the previous year. Net profit in 1949 came to $725,945, compared with $720,847 the year before.

Morrell & Co.'s earnings took a deep dive, though sales held up. Net profit in 1949 dropped to $84,065 on sales of $292,795,296. Net profit in 1948 was $2,587,741 on sales of $296,122,858.

QMC Seeks to Overcome Soil Tainted Foods

Developments of methods by which fresh vegetables grown in contaminated soil may be made safe to eat is the object of research being conducted by the Army Quartermaster Corps at Rutgers U., New Brunswick, N. J.

The university has reported, as a result of its studies, that foodstuffs such as tomatoes, lettuce, spinach and carrots may be eaten without ill effects even though tainted on the surface with harmful bacteria or parasitic worms—if such foods are pasteurized at 140 deg. F. Time required for pasteurization depends upon the kind and condition of the food item.

Contaminated foods and vegetables have presented serious problems in Army feeding in many sections of the world. In Asia, for example, human sewage is used as a fertilizer. The natives of these areas apparently are immune to amoebic dysentery and other parasitical diseases. But American soldiers and civilian personnel are not.

To provide U. S. troops with fresh fruit, the Army has had to ship such foods under refrigeration from the mainland, or raise them in hydroponic gardens.

The Rutgers report to the Quartermaster states that proper pasteurization not only kills all undesirable organisms, but does not effect the quality of the fresh foods.

Mere washing of the contaminated fruit or vegetable is not sufficient to assure suitable decontamination, the Quartermaster announcement adds.

Factory Processed Foods Poisoned Exactly 0

According to a report just released by the U. S. Public Health Service, more people died in 1948 from poisoned food prepared in their own homes and often with their own hands, than in public eating places. There were no food poisoning cases resulting from factory packed or processed foods.

The compilation shows that in 1948 there were 327 outbreaks of disease from contaminated food incapacitating 9,962 people, 17 of whom died. Six of the 17 died of botulism poisoning resulting from eating home-canned pears, tomatoes, spinach and fruit salad.

A. W. Fuchs, chief of the Service's Milk & Food Branch says that many outbreaks of gastroenteritis, diarrhea, and typhoid fever occur as a result of eating contaminated food at group gatherings where refrigeration and other food-handling facilities are usually make-shift if existing at all.

The food was usually contaminated through insanitary conditions or infections of food handlers and left without refrigeration for long periods. Even if contaminated, food will not usually develop toxins and cause food poisoning if properly refrigerated promptly after preparation.

Hoof-and-Mouth Campaign Ending Successfully

Probably the greatest campaign ever waged against an animal disease will be concluded in June when the joint U. S.-Mexican Commission for the eradication of hoof and mouth disease completes the fourth round of inoculations of 14,500,000 Mexican cattle. Inspection will be continued for two years.

The campaign, a notable success, has cost $140,000,000 to date (paid by the U. S.), but southwestern U. S. cattlemen are convinced it was worth every penny to keep the highly contagious disease away from the billion dollar U. S. beef-raising industry.

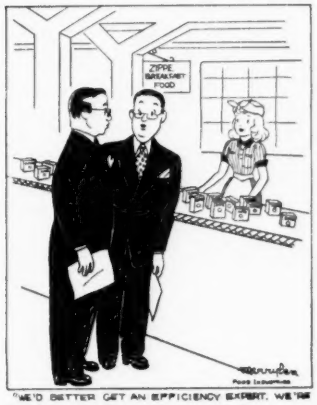
Only by taking the fight to Mexican soil was the feared disease kept on the other side of the U. S. border. The success of the campaign is demonstrated by the fact that not one single outbreak of the disease has been reported so far this year.

Retailers Speak Minds On Food Packaging

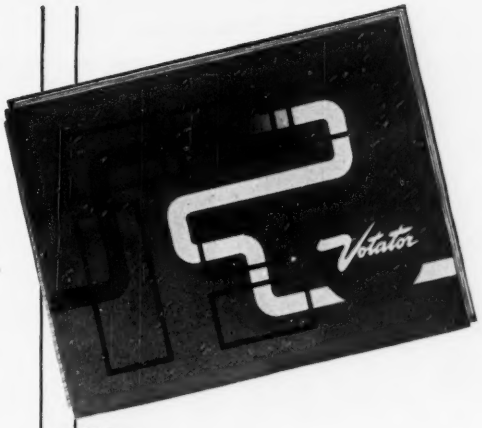
Many retailers are convinced that the sale of some goods has been retarded by the use of inadequate or ill-advised containers and packaging. This was revealed during a survey made recently by the Department of Commerce.

Most popular containers, the survey showed, are those that lend themselves to the most efficient shelving and storage, stack easily and safely, and are of a convenient family size.

Many of the retailers stated that "eye appeal" in a package was a valuable asset, but that it should not be sought at the expense of the functional quality of the package. They also noted that even the most desirable



"WE'D BETTER GET AN EFFICIENCY EXPERT. WE'RE TURNING OUT NOTHING BUT SAMPLES!"



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New and Former Abbotts' Presidents

RIDGWAY KENNEDY, JR., became president of Abbotts Dairies, Philadelphia, at a special meeting of the Board of Directors, March 29. He had been company's vice-president and general manager since 1944 and has been associated with Abbotts since 1912.

CHRISTIAN R. LINDBACK, president of Abbotts since 1914, died suddenly after a short illness while on vacation in Florida, March 20. He is a former president of International Assn. of Ice Cream Manufacturers and a former director of National Dairy Council.

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packages could not repeatedly sell a poor product.

Prepackaged merchandise is favored by most retailers because it facilitates stacking, expedites delivery, brings merchandise nearer to the consumer and thereby stimulates sales and reduces the cost of handling.

Results of the survey are incorporated in an article featured in the Spring 1950 edition of the *Containers and Packaging Industry Report*. The Report is issued quarterly and is available by subscription at 60c. a year from the Superintendent of Documents, Government Printing Office, Washington 25, D. C.

Commission Established To Investigate Tuna

An agreement between the U. S. and Costa Rica signed last year and effective March 3, established the Inter-American Tropical Tuna Commission. The group will make a joint study of yellowfin and skipjack tuna in the waters of the eastern Pacific Ocean.

Unlike the existing U. S.-Canadian agreement on sockeye salmon and halibut (which includes regulatory provisions) the tuna agreement sets up a purely investigatory commission.

Information will be obtained on kinds of fish commonly used as bait in the tuna fisheries and other varieties of fish taken by the tuna vessels.

"Any regulatory measures which are indicated by the study would have to be the subject of future negotiations between the two countries," the Department of State declares.

The Department claims that scientific information presently available is not sufficiently extensive to indicate whether or not tuna stocks are in danger of depletion.

Multi-Fortified Milk Gets Market Test

Market trials of a new multi-fortified milk are being conducted by The Borden Co.'s fluid milk operation in Oklahoma City and Phoenix, Ariz. Known as Gail Borden Signature Quality Milk, the product contains added quantities of vitamins A and D, thiamin, niacin, riboflavin, iron and iodine.

Distribution of the product will not be extended into other markets until an exhaustive experience has been gained in these two pilot operations. Both sales executives and nutritional agencies are watching the tests to appraise the acceptance of the new milk by consumers. The approval of multi-fortification of milk by nutritionists would facilitate changes in state and municipal ordinances, which now make it impossible to introduce multi-fortified milk in many areas. The long-term sales experience will be considered by company management in deciding whether the product will be introduced in additional markets where multi-fortification is now permitted.

In Oklahoma City and Phoenix, the milk is packaged in amber glass bottles specially designed to protect the natural and added vitamin content from the effects of exposure to direct sunlight.

Now They Want We Should Consume More Spuds

In the midst of the current debacle on potato surpluses, Agriculture Department's Potato Advisory Committee met in March and recommended that top priority be given to research that will result in more outlets for this surplus crop.

P. V. Cardon, administrator of agricultural research for the Department, agreed. On March 1, grower and dealer stocks were almost 88,000,000 bu., 24 percent larger than a year ago, and 17 percent higher than 1947.

The committee wants the Department of Agriculture to:

1. Conduct research to determine the relationship of the nutrients in potatoes to human health.

2. Explore the possibilities of promoting increased consumption of potatoes through the use of visual and other educational media, especially in schools.

3. Study the feasibility of using large containers that are adapted to handling with fork lift trucks in rail and truck transportation of potatoes.

4. Determine what effect potato waxing has on eye appeal, edibility, and keeping quality.

5. Conduct research on the processing and packaging of potato chips that will help the potato chip industry to offer consumers a uniformly high quality product the year round.

6. Compile and publish a handbook or digest of all available information on the value and use of potatoes as human food.

The committee, which speaks for the industry, also wants the Department to continue its work on conversion of potatoes to more stable forms. The need for developing methods of freezing and drying of potatoes was stressed.

The growers want a program to counter the "green vegetable" campaign made by teachers and nutritionists, which in recent years has resulted in a substantial decrease in potato consumption.

Growers and shippers apparently believe the key to the potato surplus is a reversal of the trend by a change in the dietary habits of Americans.

They are mindful that potato supports may be withdrawn at the whim of Congress as soon as enough taxpayers become fed up with the squandering of their money for destroying

potatoes and incidentally creating a new "millionaire farmer" class.

The current Congressional investigation of price supports will show individual farmers getting fabulous sums, ranging to $1,000,000 and more.

Representative Jesse P. Wolcott, ranking minority member of the House Banking Committee, wants Agriculture Department to list those farmers receiving more than $100,000 from the government, or at least give a count of them. So far, Agriculture has refused, saying it would be impossible to prepare such a list unless a large crew was put to work tracing checks and vouchers.

Meanwhile, growers and shippers want to get down to fundamentals and see how they can expand the market for potatoes so that the industry (and it is an industry) does not totally collapse when government largesse is removed.

Candy Sales Drop

A slump in bar and bulk candy sales for Jan. 1950, as compared with the same month in 1949 is indicated by the Bureau of Census. Packaged goods held its own.

Reports of bar goods manufacturers indicate a decrease in January sales of 7 percent from Jan. 1949. Reports from bulk goods manufacturers show a 20 percent drop while sales of packaged goods manufacturers were about the same as in Jan. 1949.

Demonstrating Service

Food store demonstrations are far from new, but a special organization to provide that service is termed one of our unique postwar developments by Dave Margolis, merchandising chief of Food Store Demonstrations, Inc., New York City. Demonstrations of complementary items, produced by different manufacturers, are one of methods Margolis uses to keep down costs.

Operating a major airline like Capital over 5,409 route miles in the industrial heart of the United States, requires aircraft servicing bases of considerable size. One such base in Chicago daily readies planes for passenger, mail and cargo service. Maintenance operations of this type present serious fire hazard problems, for a flash fire in the hangar area could result in building and equipment losses of staggering proportion. That's why Capital Airlines safeguards her capital investment with "Automatic" Sprinkler fire protection.

Scores of sensitive Rate-of-temperature-Rise heat detectors stand ready to discover fire at the first indication of flame. Hundreds of scientifically spaced "Automatic" Sprinklers, operating off a battery of Suprotex-Deluge systems, are prepared to shower water throughout the fire area, thereby protecting the building and contents. And most important, the entire operation would be accomplished within seconds from the time the fire originated. Little wonder that Capital looks upon "Automatic" Sprinklers as an important improvement in their unceasing program of positive fire defense.

Whether yours is an airline operation or any other type of commercial, industrial or institutional business, you'll get dependable fire protection with "Automatic" Sprinklers. Write or call today for complete information on how you can save lives ... save property ... and save money with "Automatic" Sprinklers.

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—with capacities of up to Hundreds of Tons per hour of various materials—hot or cold—dry or damp—from fine powders to big abrasive lumps.

—at instantly controllable rates—just turning a rheostat or reactor dial gives a range of feed, from a trickling dribble to a gushing torrent.

VIBRATING GRIZZLIES

Feed and Scalp in one operation.

Increase crushing capacity and efficiency.

Bypass fines—oversize to crusher.

No motors, gears, pulleys, etc. to maintain.

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Removing foreign objects and lumps from powdered coffee, sugar, salt, etc. Dewatering chopped and dice vegetables, classifying peas, beans, nuts, etc.

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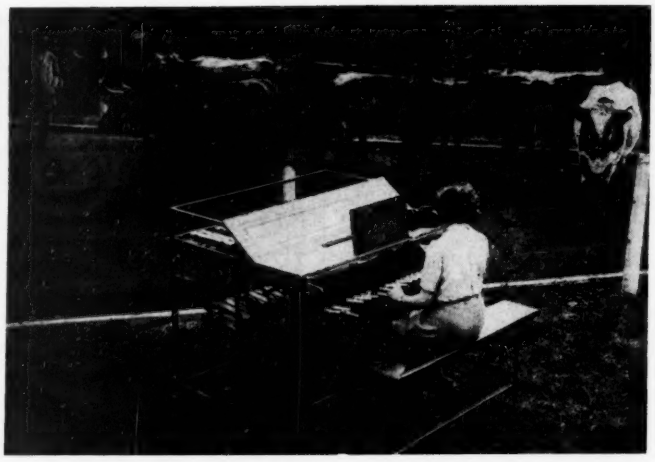


Lady Tests a Theory

A portable carillon provides the means for this British dairy maid to test her theory that music for cows results in heavier milk production. She is seen here serenading a herd on its way to the milking barn. The cows don't look impressed. (Wide World)

Apple Juice Handling Defended in Canada

Paul Walrod, manager, B. C. Fruit Processors, Ltd., grower-owned plant at Kelowna, B. C. recently expressed disagreement with views of Hans Freund, European scientist, regarding the methods of handling apple juice.

Dr. Freund deprecated B. C. methods and forecast delivery of the juice by tank truck unpasteurized on a day-to-day basis. However, Mr. Walrod states the methods used in shipping apple juice in Europe are obsolete and that the industry in British Columbia is possibly further advanced than anywhere in the world.

Mr. Walrod said: "The method of preservation referred to by Dr. Fruend has been used in Germany and Switzerland for many years and is considered by us to be obsolete. Such a process was attempted at Selah, Wash., some ten years ago. The product was unacceptable to the American palate, and the business failed."

The Kelowna man, with an international reputation as an expert in his field, pointed out that the tank truck method has been used to transport apple juice in bulk from Yakima to Seattle.

"It has been found," Mr. Walrod said, "that this method of distribution can only be used over a period of five to six weeks in the fall, and volume has never developed."

He said that contrary to the Freund claim that heat destroys flavor and dietic values in apple juice, it has been discovered that flash heating to a temperature of 190 deg. is necessary to preserve these values.

Dr. Freund had also compared the 1 gal. per capita consumption of apple juice in Switzerland to the 1 qt. figure in Canada. To this Mr. Walrod countered. "We ship 150,000 cases, each containing 3½ gal., into Greater Vancouver each year. I am not sure of the population of this area, but it would appear that in ten years we have developed this market into the highest in the world on a consumption basis."

Arrange Four New Courses In Bakery Sanitation

Dates and places for four courses in bakery sanitation are being announced by Edward L. Holmes, director, department of sanitation, American Institute of Baking. Courses are scheduled for Chicago, May 21-24 at the Sheraton Hotel; New Orleans, June 4-7, at the Jung Hotel; St. Louis, September 10-13, at the Hotel Melbourne; and San Francisco, October 1-4, Whitecomb Hotel.

The courses have been designed to give bakers a clear understanding of the various problems of bakery sanitation, and to present to them a program, adequate and inexpensive, that can be applied in bakery plants to maintain a high level of sanitation. Previous courses given during the past few years in all parts of the country have brought a response from members of the baking industry, stating that as a result they have been able to operate under better sanitary conditions.

Pineapple Concentration Pushed in Puerto Rico

Puerto Rico is attempting to develop a new market for its growing pineapple industry with the production of frozen concentrated pineapple juice that, it is said, will be ready for retail markets this year. Machinery and all necessary equipment is ready for installation in a plant occupying a renovated building near Bayamon.

Norman E. Parkhurst, veteran pineapple planter who has been operating in Puerto Rico for many years, said recently that he expects to produce about 400,000 cases of 6 oz. cans per season—and that the first pack will be available in the metropolitan markets around New York.

Present installations, he said, will occupy only about one-third of the eventual size of the plant, which will have a potential capacity of 1,000,000 gal. when additional equipment is installed.

Concentration of pineapple juice provides a completely new industry to the island, which now has about 5,000 acres planted in pineapple, harvested and packed generally from December through July each year. Parkhurst plans to complete his frozen pineapple concentrate pack during this period, then convert the equipment for processing oranges and possibly grapefruit.

Although Puerto Rico pineapple, sliced, cubed and juiced, has been canned and shipped to stateside markets at the rate of about 1,000,000 cases a year, in addition to about 300,-

Death Takes Medalist

Thomas M. Rector's death Mar. 31 following a heart attack requires that this year's Nicholas Appert Medal be awarded posthumously. Mr. Rector had been named before his death as the 1950 recipient in recognition of his contributions to food technology, which are outlined on page 124 of this issue. Award is made annually by Chicago section of IFT.

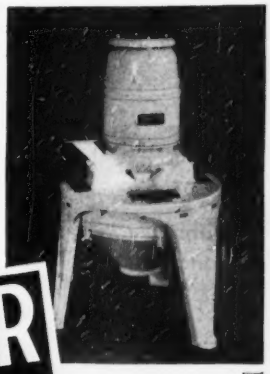
Stop INSECT SPOILAGE ...with "ENTOLETER" Continuous Insect Control

This low-cost Continuous Insect Control is paying off in hundreds of processing plants, by permitting the manufacture of food products free of insect-life.

"ENTOLETER" Infestation Control destroys all stages of insect-life... eggs, larvae, pupae and adults... in flour, meal, mixes, cereals, powdered soups and similar free-flowing dry materials.

It protects incoming raw materials, materials before and after storage, and your finished products before packaging. By destroying all insect-life, the threat of insect multiplication is eliminated, and food materials are protected from adulteration by insect excreta.

In addition to its primary function of insect control, the "ENTOLETER" system is an excellent means of blending flours, mixing compounds, and improving vitamin distribution. It is entirely mechanical; uses no heat, gas or chemicals; and does not change the moisture content of food ingredients or products. The "ENTOLETER" Centrifugal Machine is easy to install; simple to operate and maintain.



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Full Bloom

Caption to this picture says the young lady "sets off the blossoms and the fruit waiting to be picked." That's how we happened to notice that this orange tree was in bloom even though the fruit had already ripened. (Wide World)

000 crates of fresh fruit, this is the first attempt to diversify the industry by introducing a frozen pineapple concentrate on the market. Growers elsewhere have not yet started production.

In 1949, Puerto Rico pineapple growers shipped a bit less than 50,000 tons to stateside markets, but a slight drop is expected this year. Some of the slack will be taken up by the introduction of frozen concentrated pineapple juice.

Users Warned Against Sugar Supply Leaks

A more realistic approach in carrying out the U. S. sugar program is urged in a ten-page booklet, "What Price Sugar—Battle of the Sugar Bowl," issued by the American Bottlers of Carbonated Beverages. The booklet is being widely distributed among appropriate government officials, industrial sugar users, and consumer organizations, according to John J. Riley, secretary of the association.

Pointing out that orderly marketing of any commodity requires a pipeline with adequate reserves at key points between producer and ultimate consumer, the booklet uses a diagram to show how administration of the Sugar Act of 1948 is resulting in a steady depletion of the stocks of sugar in the American market.

Two important facts are emphasized in the booklet: (1) Reserves of sugar today are lower than they were under drastic wartime control when there was an actual shortage, (2) per capita sugar consumption in 1949 was 13 lb. less than it was 25 yr. ago. Users are also warned not to be lulled by claims of the early season plentiful supply. Supplies, it says, are always plentiful at the beginning of the season when new crops are coming in.

Alaskan Shrimp Fishing Explored by New Ship

U. S. Fish & Wildlife Service's new motor vessel, the *John N. Cobb*, is doing exploratory fishing for large shrimp in the hope of establishing an off-season fishery in Alaskan waters.

The 93-ft. all-wood, ship was commissioned in Seattle last February and sailed for Ketchikan, Alaska, last month on a 2-month "shakedown" cruise.

If quantities of large shrimp can be found in the deep water channel near Ketchikan, an additional source of income will be opened to small-boat operators in Southeastern Alaska after the salmon season closes.

After its return to Seattle around June 1, and its checkup, the vessel is scheduled to sail on a cruise to trace albacore tuna migrations off Southeast Alaska and other points in the Pacific. The Fish & Wildlife Service says that this exploratory work may help to establish an important tuna fishery for Alaska.

The *Cobb* is equipped with the latest navigational equipment, including radar, loran, two depth-finding devices, and electro-mechanical steering. An experimental-sized refrigerated hold, bait tanks, brine wells, and all fishing equipment for seining, longline fishing, surface and deep trolling, and trawling are part of the gear. The vessel is reported carrying experimental rigs of unorthodox design, some made especially to test methods of shrimp fishing the Ketchikan channels which are rocky and where trawls cannot be used successfully.

Australians Increase Sugar Capacity

Sugar mills in Queensland, Australia's big Pacific Coast state, are planning to spend more than $10,000,000 in improving their crushing plants.

The decision is a result of the recent Empire sugar talks in London, at which Britain agreed to take 600,000 tons of Australian sugar each year over at least eight years, beginning in 1952. An expansion in mill crushing capacity is essential because an unduly prolonged crushing season would entail loss of sugar through handling

over-mature cane crops. The expansion will be confined to existing mills because equipment shortages preclude the establishment of new mills before 1952.

The British Food Corp. continues to do much better in Queensland with sorghum than it is doing in East Africa with groundnuts. Now in its second year of operation, the BFC scheme in Central Queensland is progressing favorably. Last year a total of 30,000 acres was harvested. This year 35,000 acres of the rust-red crop are awaiting the harvesting machines. An additional 35,000 acres will be planted on ground already broken.

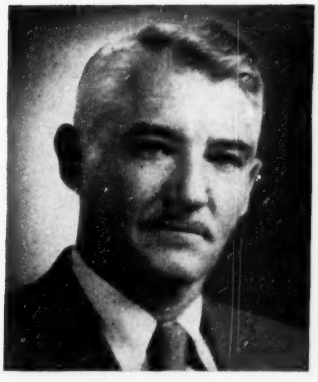
For the time being, the grain will be shipped to England as feed for English hogs, but in a year or two hog-raising will be established in Queensland as part of the project.

Research Grants

Twenty-two grants-in-aid by Swift & Co. to support long-range basic scientific studies in agriculture and shorter term research projects in human nutrition have been announced by Roy C. Newton, vice-president in charge of research.

Eighteen universities, colleges and other research institutions in the U. S. and two in Canada were recipients of the grants, totaling more than $120,000.

This brings the total of awards from Swift & Co. for basic research to more than $2,000,000 in the last ten years.



To Receive Babcock Award

Carl R. Fellers, chairman, department of food technology, University of Massachusetts, and president, Institute of Food Technologists, will receive Nutrition Foundation's Stephen Babcock Award at 10th annual meeting of IFT, in Chicago, May 22. Presentation will be made by Charles Glenn King, scientific director of Foundation.

TOLEDO—the Heart of Accurate Cost Control

More and more under today's conditions Toledos give you the assurance of close cost control so vitally needed for profitable operations.

Toledos fit the needs of the most modern plant layout . . . they're *speedy, accurate, dependable* . . . providing vital cost-data on materials and products every step of the way . . . in receiving, shipping and production. Whether it's weighing, checking, testing, counting, batching or force-measuring—there's a Toledo to help you *control costs and quality!* Factory-trained Toledo service men near you in 200 cities of United States and Canada. Toledo Scale Company, Toledo 1, Ohio.

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STOP ERRORS

Toledo Printweigh Scales provide printed weight records . . . assure you that the accurate indication of the Toledo dial will reach your accounting records without chance of human error.

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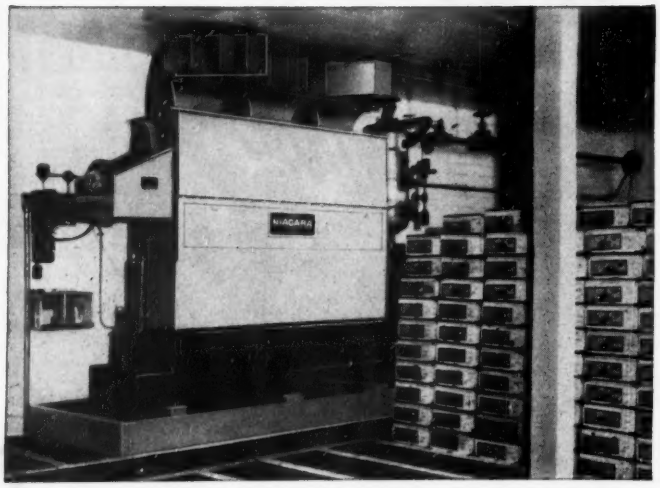

TEMPERATURES NEVER RISE... with NIAGARA "NO-FROST"

● With the Niagara "No-Frost" Method, your refrigerating operation is never interrupted for defrosting since at no time is there ever any accumulation of ice or frost on the coils of the Niagara "No-Frost" Spray Cooler.

If you are *pre-cooling*, the full capacity is always there to handle the "live load" and you get quicker chilling of your product to the core with no rise in temperature at any time. If you are *freezing*, the process is continuous and faster, and you get more production. If you are *holding* fresh or frozen food, there is never any temperature rise to endanger the quality.

The Niagara "No-Frost" Method saves money in its operation. A user recently said: "We added a new freezing room to our plant without any additional cost for power". This was accomplished because the Niagara Aeropass Condenser held the head pressure down to the minimum for the entire plant, while the Niagara "No-Frost" Spray Cooler operated at higher suction pressure.

Write for Niagara "No-Frost" Bulletin 105 and details of operation for the type of refrigeration in which you are interested.

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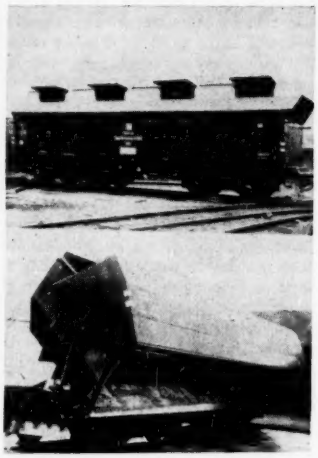


German Grain Carrier

Doesn't take long to unload the grain from this newly built German box car. An air pressure device tilts car and grain pours out. With a gross loaded weight of 165 tons, car has a capacity of about 3,178 cu. ft. (Wide World)

Early Tomato Developed By New York Station

A new tomato that will produce at least ten tons of red ripe tomatoes for processing before September 10, when apple pickling usually begins in western New York, is now available to apple growers.

Called "Gem", the new tomato was developed by canning crops specialists at the Experiment Station at Geneva at the request of fruit growers. A tomato that will produce a commercial crop before apple harvest sets in will enable fruit growers to employ pickers for the tomato harvest and then move them into the orchard without loss of time.

Birds Eye Plans Increase In Frozen Poultry

Birds Eye-Snider will increase its production of quick-frozen poultry 20 percent this year to an all-time high, it was recently revealed. "We have stepped up our production schedules in order to meet an ever-increasing public demand for our quick-frozen poultry," stated T. H. Ramsay, manager of the poultry division of the Birds Eye-Snider Division of General Foods.

"The new increase will mean we have tripled our production of quick-frozen poultry in the past three years. Quick-frozen poultry production for the in-

dustry as a whole has expanded 60 percent in the same period. More than 200,000,000 lb. of quick-frozen poultry was produced by the industry in 1949."

Ramsay disclosed that during 1949, 13½ lb. of quick frozen poultry were produced for every pound quick-frozen in 1939. The average annual per capita consumption of chicken, he stated, is 15 percent greater than before the war.

Tea Campaign

The more than $1,000,000 advertising campaign of the tea industry will start May 29, according to Robert B. Smallwood, chairman of the newly formed Tea Council, which represents the tea trade of the U. S. and the principal tea producing countries of the world.

Speaking on behalf of the council, Mr. Smallwood said, "This venture in 'partnership marketing' has great significance. The funds have been raised on a 50-50 basis. The tea producers in the sterling area countries have joined hands with the American tea trade in a common undertaking to earn more dollars."

F&DA Food Standards

Food standards actions by Food & Drug Administration up to the beginning of April embody several important developments:

Canned mushrooms again were to be the subject of a hearing, to supplement the record made last Aug. 18 (no

Three's Really a Crowd

The lady here came through with a unique performance in cattledom—delivered triplets. But more than that, two of the offspring are twin freemartins, the first ever recorded. The remaining calf is a gent. All four have been taken over by Ohio State University. (Wide World)

One Battery-Powered Truck

Triples warehouse capacity with one-third reduction in floor area!

Saves $1.00 per ton in unloading and storing . . . Provides contamination-free handling for VIMCO MACARONI PRODUCTS COMPANY

Electric truck stacks palletized bags 3 tiers high.

The entire production program of Vimco Macaroni Products Company at Carnegie, Pa., is now geared to the speedy and efficient work of *one* electric industrial truck. By tiering pallet loads of raw material three-high, useful storage space was tripled, production space was increased, and need for a new warehouse was eliminated.

Two men and a battery-powered truck unload an 80,000 lb. car of sacked semolina in four hours. A saving of $46.00 per car totals almost $1,500 per month *in car-unloading alone.*

Used in loading and unloading, storing, production movement and maintenance work, this one truck *must* be available at all times . . handling foodstuffs, it must be fume-free. Mr. Samuel T. Viviano, Secretary and Treasurer of the Company, says, "A battery truck is the only powered machine that will give us this type of service. We have come to rely on the work done by this truck to such an extent that we couldn't operate without it."

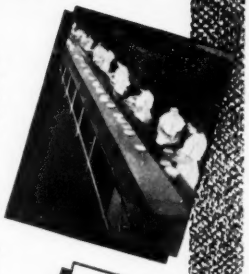
Another example of electric truck *dependability* and *cleanliness* helping industry—while providing material handling *at lowest cost per unit moved.* This criterion, rather than initial investment, explains why so many industries prefer battery-powered trucks!

THE ELECTRIC INDUSTRIAL TRUCK ASSOCIATION
3701 NORTH BROAD STREET, PHILADELPHIA 40, PENNA.

Where Can This
MOVING TABLE TOP OF STAINLESS STEEL
...increase YOUR processing efficiency?

Sandvik's Stainless Steel Belt Conveying Work Tables Are Minimizing Costs In Operations Such as Chicken Eviscerating • Bacon Slicing • Frankfurter Packing and Weighing • Hamburger Preparation • Tenderizing • Cake-icing • Cup-cake Icing and Packing • Ham-boning • Pork Rolling Fish Filleting • Vegetable Preparation Potato Chip Distribution, etc.

Here's a way to modernize food handling operations. Sandvik's standard work table units carry your product on a flat, endless band of 302 or 316 stainless steel. Units can be adapted to virtually any application.



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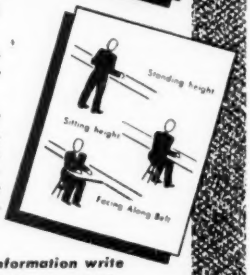
EASY TO KEEP CLEAN—Live steam or boiling water can be applied directly.

NO TASTE CONTAMINATION—A smooth, impermeable surface . . . No place for food particles to lodge.

LONG SERVICE LIFE—Sandvik steel belt has inherent high strength and resistance to time and wear.

ENGINEERED TO FIT APPLICATION—Lengths to meet any center distance. Standard work table widths are 20" and 12" but special widths are also available. Correct working height can be arranged despite special floor conditions. Special, custom-built units also available. SS-59



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tentative order had been issued). Apr. 10 was the date set to consider additional evidence on optional ingredients with canned mushrooms, and (upon F&DA initiative) to consider establishing a standard of fill of container. Notice of the hearing was published on p. 1310 of the Mar. 10 *Federal Register*.

Residue tolerances continued as the subject of the hearing that was started in January. Because of the quality of evidence submitted by federal and state witnesses in the first two months of the hearing, interested manufacturers of insecticides and other agricultural chemicals were cutting back their estimates of the time required to present their testimony. Originally Part A of the hearing was expected to last well into July. It is now hoped officially that Parts A, B, and C can all be completed by the end of May. Following Part C a recess will be taken before the toxicity data are begun in Part D.

Bread standards of identity will not be issued before mid-summer, according to one official guess.

Salad dressings and *cheeses* final orders were still awaited in early April. *Frozen fruit* and *canned corn* tentative orders were also awaited. Part of the delay in issuing these orders has been occasioned by personnel vacancies in the Federal Security Agency offices responsible for the standards, and part by the new Margarine Act of Mar. 16, 1950, which becomes effective on July 1 (Public Law 459, 81st Congress).

Margarine labeling will be the subject of both official and industrial concern as a result of this new Act. An official statement on the subject was expected in early April.

Use of "foreign" fats in *chocolate* products and in *frozen dairy products* has been discussed informally with Food & Drug officials. Industry apprehension over potential market losses to competitive fats may occasion review of the existing chocolate standards and hasten consideration of ice cream standards.

USDA Grade Standards

Recent actions by Production & Marketing Administration of U. S. Department of Agriculture on U. S. Grade Standards and related activities include the following:

Green tomatoes for processing, new, p. 1479, Mar. 16 *Federal Register*, effective Apr. 15.

Canned field peas and canned blackeye peas, new, p. 1539, Mar. 18 *Federal Register*, effective Apr. 17.

Canned apple juice, first revision, proposed, p. 1844, Mar. 31 *Federal*

Does your product have this advantage?

Calcium and phosphorus enrichment is an important selling feature—one which lends itself to aggressive promotion of your product. Many food manufacturers recognize the health advantages of calcium and phosphorus enrichment—building sound teeth and strong bones. They've discovered that the demand for enriched foods is increasing rapidly.

Victor dicalcium phosphate is used extensively for mineral enrichment of cereals, flour, baby foods, candy, and many other packaged foods. This important enrichment material offers not only a ready supply of calcium but provides phosphorus as well, in the proper ratio for assimilation.

Victor dicalcium phosphate is a white, tasteless, odorless, finely-powdered material which complies with all Food and Drug Laws.

Write for Quotations, Technical Data, or Experimental Samples

DICALCIUM PHOSPHATE, U.S.P.

Hydrated—$CaHPO_4 \cdot 2H_2O$

Typical Analysis:

Phosphorus	18.0%
Calcium	23.6%
pH (50% suspension)	6.8—7.5

Available in 80 lb. paper bags.

DICALCIUM PHOSPHATE

Anhydrous—$CaHPO_4$

Same high purity as hydrated material. It contains no water of crystallization and offers a more concentrated source of calcium and phosphorus.

Typical Analysis:

Phosphorus	22.3%
Calcium	29.0%
pH (50% suspension)	6.8—7.5

Available in 100 lb. paper bags.

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WATEROUS SANITARY PUMP!

Removal of gear case cover (after liquid chamber is taken apart) permits the entire shaft assembly, including pilot gears and bearings, to easily slide out. Bearings and timing gears are isolated from liquid zone and operate in oil making for long service and quiet operation. Non-lubricating materials and semi-solids are handled with minimum wear. WATEROUS Sanitary Pumps are your best buy!

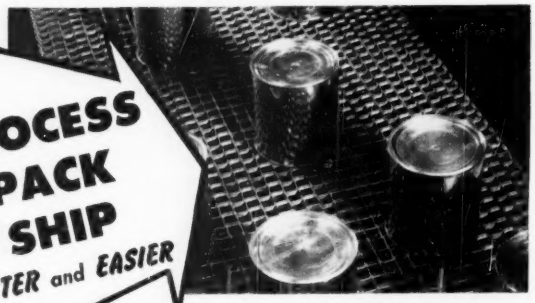
If it's 100% Sanitary—it's a WATEROUS

Waterous
DEPENDABLE PUMPS
SINCE 1886

DESIGNED AND MANUFACTURED
BY EXPERIENCED ENGINEERS

Write for
Bulletin No. T-204

WATEROUS COMPANY
80 EAST FILLMORE AVE.
ST. PAUL 1, MINNESOTA



WITH LA PORTE
FLEXIBLE STEEL CONVEYOR BELTING

You can step up every food-handling operation from the loading hopper to shipping room with La Porte Conveyor Belting.

Its rugged steel construction provides for long service. The open mesh feature permits quick cleaning with steam or scalding water without removing belt from friction drum. Also allows for circulation of heat, cold, liquid or air around products in process.

Flexible feature assures tight grip of belt on friction drum—eliminating creeping, weaving and jumping. It provides a perfectly flat surface for containers, empty or filled. Made of best galvanized material obtainable. It's the most dependable and economical belt for every process and handling operation.

Write at once for literature and price—no obligation.

LA PORTE MAT & MFG. CO.
BOX 124 LA PORTE, INDIANA

Register, written comments received until Apr. 30.

Husked corn on cob, new, proposed, p. 1118, Mar. 1 *Federal Register,* written comments received until Mar. 31.

Barley, revised, p. 1455, Mar. 15 *Federal Register,* effective July 1.

Cantaloups, first revision, proposed, p. 1731, Mar. 29 *Federal Register,* written comments received until Apr. 28.

Sugarcane syrups and molasses were discussed at two meetings in March. The first of these meetings, held in New Orleans Mar. 7, included a discussion of proposed quality standards. The second meeting, Mar. 27 in Tallahassee, was limited to sugarcane syrups only. Next move will be publication of proposed quality standards that have resulted from these conferences.

Schedule of Events

May

1– 3—American Oil Chemists' Society, Spring meeting; Atlanta Biltmore Hotel, Atlanta.
1– 4—U. S. Brewers Foundation, 74th annual convention; Fairmont Hotel, San Francisco.
7–10—Flavoring Extract Mfg. Assn., 40th annual convention; Hotel Traymore, Atlantic City, N. J.
7–11—American Society of Brewing Chemists, annual convention; Hotel Statler, Detroit.
11–13—Mayonnaise & Salad Dressing Mfg. Assn.; Chicago.
14–18—American Assn. of Cereal Chemists, 35th annual convention; Sheraton Hotel, Chicago.
14–18—Super Market Institute, 13th annual convention; Hotel Stevens, Chicago.
15–17—Millers National Federation, 48th annual meeting; Edgewater Beach Hotel, Chicago.
21–25—Institute of Food Technologists, 10th annual meeting; Edgewater Beach Hotel, Chicago.

June

1– 2—American Society of Quality Control, 4th national convention; Auditorium, Milwaukee.
4– 7—American Society of Refrigerating Engineers, 37th spring meeting; Hotel Muehleback, Kansas City, Mo.
5– 8—National Confectioners Assn., 67th annual convention, and 24th industry exposition; Waldorf Astoria and Grand Central Palace, New York City.
12–30—Massachusetts Institute of Technology, 3-week course in Food Technology; Cambridge, Mass.
20–22—American Dairy Science Assn., 45th annual meeting; Cornell University, Ithaca, N. Y.
29–July 1—Grocery Manufacturers of America, mid-year meeting; The Greenbrier, White Sulphur Springs, W. Va.

—End

Do you measure salt by RULE OF THUMB?

For Accurate Salt Measurement *"PASS the SALT"* by LIXATOR*

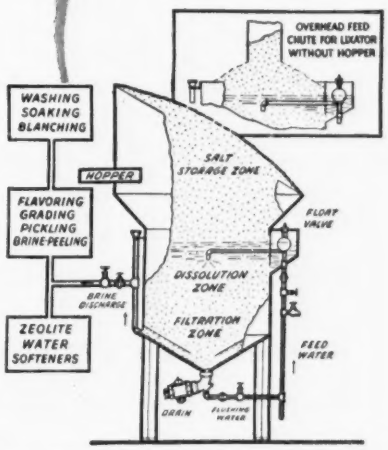
RULE of thumb measurement of salt by volume, in bucket or shovel, or by weight is inaccurate and wasteful.

For example, in measurement by dry salt volume, one cubic foot of dry salt will weigh *anywhere* from 66 to 84.5 pounds. And measurement by dry salt weight is "guesswork," too, for salt may contain from .05% to 5.0% moisture depending upon humidity, length of time in storage, varying bulk and area of the stock pile.

BUT... with the Lixate Process salt measurement is *exact*. Each gallon of Lixate Brine *always* contains *exactly* 2.65 pounds of Sterling Rock Salt. For the Lixator *automatically* makes 100% saturated, crystal-clear, self-filtered brine, that meets the most exacting chemical and bacterial standards. And this brine can be *easily* and *accurately* diluted volumetrically to any desired strength.

Because of this, accurately measured Lixate Brine is widely used in food processing... in the "flotation" method of grading small vegetables and grains with salt brine of *known* specific gravity. Lixate Brine is also used to flavor foods... to wash and preserve vegetables and fruits before processing.

Consult our Technical Service Department on your use of salt and brine. The experienced men on this staff will advise you on the proper location for Lixator and salt storage, pumping arrangements, types of pumps, meters, and valves. They will fit the *money-saving* Lixator into your plant operations. Write today!



HOW THE LIXATOR WORKS—*In the dissolution zone*—Flowing through a bed of Sterling Rock Salt which is continuously replenished by gravity feed, water dissolves salt to form 100% saturated brine. *In the filtration zone*—Through use of the self-filtration principle *originated by International*, the saturated brine is thoroughly filtered through a bed of undissolved rock salt. The rock salt itself filters the brine. Nothing else is needed.

The **LIXATE** *Process*
REG. U.S. PAT. OFF.
for making brine

INTERNATIONAL SALT COMPANY, INC.
Scranton, Pa.

NOW AVAILABLE
The New Stainless Steel STERLING* MODEL LIXATOR*
For "Lifetime" Use
For Greater Economy
For Added Cleanliness

*Trade Mark

NEW PRODUCTS DATA SHEET

Subject: New products made from Carpenter Stainless No. 20, previously available only in cast form known as Durimet 20. The alloy's wrought forms, such as bars, strip and tubing developed by Carpenter, have resulted in many new and improved products such as those described here.

Outstanding Characteristics of "No. 20":

18-8 No. 20

Highly resistant to the corrosive effects of many acids and their fumes, *No. 20* has been found to increase equipment life from 2 to 20 times. Acids handled by *No. 20* include sulphuric, nitric, formic, acetic and many others, as well as corrodents such as copper sulphate, lead nitrate, sodium phosphate, etc. The part shown here is used in a process involving sulphuric acid.

Forms Available:

from Alloy Tube Division
The Carpenter Steel Co.
Union, N. J.

TUBING standard sizes and gauges from ⅜" through 2⅜" O.D.
PIPE I.P.S. ¼" through 2"
SHEET in these gauges: 24, 22, 20, 18, 16, 14 and 11
PLATE ¾", ¼", ⅜", ½", ⅝", ¾" with heavier plate or forgings made to special order

from The Carpenter Steel Co.
Reading, Pa.

BARS all standard sizes and finishes, **WIRE** .050" Rd. and larger, **STRIP** (Cold Rolled) .010" and heavier in widths up to 8", **BILLETS** for reforging.

New Technical Bulletin Available

Information on No. 20's corrosion resistance, workability and mechanical properties is in this 18-page bulletin. To get a copy, write on your company letterhead and ask for the Carpenter Technical Bulletin on Stainless No. 20.

THE CARPENTER STEEL CO., ALLOY TUBE DIVISION, UNION, N. J.

OTHER PRODUCTS NOW BEING MADE from Carpenter Stainless No. 20

Names of the manufacturers of these products will be supplied upon request.

CASTINGS
CLAD PLATE
FASTENINGS

FITTINGS (screwed or flanged)

FORGINGS
HOSE (flexible)
PUMPS

WELDING ELECTRODES

WIRE—under .050" Rd.
WIRE CLOTH
VALVES

Many kinds of equipment such as heaters, coils, pickling tanks, fume ducts, etc. are made from Carpenter Stainless No. 20. Whatever your needs, we will try to put you in touch with the suppliers.

Carpenter

STAINLESS NO. 20

Licensed under patents of The Duriron Co., Inc.

Changes in Food Supplies

Stocks

CANNED FRUITS AND VEGETABLES in canners' hands March 1, compared with 1949, were reported as follows by NCA:

	Actual Cases (000 omitted)	
	1949	1950
Sweet corn	12,610	18,316
Peas	10,413	7,297
Tomatoes	7,679	6,232
Green and wax beans	2,265	5,387
Beets	743	2,610
Asparagus	157	309
Carrots	1,111	1,055
Red pitted cherries	281	699
	(Basis 24/2½'s)	
Peaches	7,119	8,644
Pears	1,800	2,232
Sweet cherries	161	595
Apricots	2,450	1,195

Storage

FROZEN FISH AND SHELLFISH held in storage March 1 was down to 104,346,374 lb., compared with 125,515,984 lb. held a month earlier. Holdings on Mar. 1, 1949 were 104,138,449 lb.

PUBLIC COOLER occupancy declined 4 points during February, to stand at 55 percent on March 1. Average decline for February is only 2 points. Occupancy was 6 points below the average for the date.

FREEZER occupancy, at 74 percent on March 1, had declined only 1 percent under February 1. Average occupancy for the date is 76 percent, while the normal decline during February is 3 points.

Production

EVAPORATED MILK production was 183,000,000 lb. in February, up 14 percent from February 1949, but 12 percent under the five-year February average.

CANNED CONDENSED MILK production dropped to 5,900,000 lb. in February, the lowest for the month since 1942. Output was 51 percent under a year earlier and 32 percent below the five-year average for the month.

CREAMERY BUTTER produced during February was estimated at 97,085,000 lb., 5 percent above February 1949 and 11 percent higher than the 1944-48 average for the month. The January-February decline, however, was 4 percent, compared with only a fractional drop a year ago and a drop of 3 percent in the five-year averages.

AMERICAN CHEESE production in February, estimated at 53,110,000 lb., was 8 percent below February 1949, but 7 percent above the five-year average for the month. The January-February decline was 3 percent, compared with a 1 percent drop last year and an increase of 5 percent in the five-year averages.

ICE CREAM turned out in February reached 33,105,000 gal., a 4 percent increase over February, 1949 and 10 percent above the five-year average for the month. February production increased 5 percent over January.

MARGARINE output amounted to 77,453,000 lb. in February, a gain of 3,517,000 lb. over February 1949 and 13,858,000 lb. over the 1945-49 average for the month.

TOMATO PULP packed in 1949 totaled 3,060,794 cases on a 6.10's basis, which compares with the 1948 pack of 2,789,605 cases.

NONFAT MILK SOLIDS produced in February came to 65,500,000 lb., a 10 percent increase from February, 1949, and 62 percent above the 1944-48 average. Spray-drying represented 46,000,000 lb., a record high for the month and 7 percent above February 1949. Roller-dried totaled 19,500,000 lb.—up 18 percent from a year earlier.

Indexes

The commodity index on foods, compiled by the *New York Journal of Commerce*, was at 171.9 for the week ending April 14. This compares with 170.4 for the previous week, 171.5 for March, and 181.6 for April, 1949.

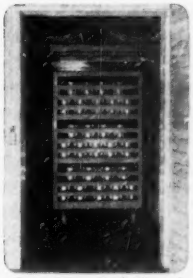
Business Week's index on business activity was up to 203.7 for the week ending April 8. The previous week it stood at 203.3; a month earlier it was 189.4, and a year earlier, 194.6.

CONSTRUCTION

	Pending (thousands)	Total Awarded April (thousands)	Total Awarded 1950 (thousands)
Bakery	$3,575	$100	$3,139
Beverages	318	136	2,673
Canning and Preserving	1,068	.....	400
Cold Storage	.....	.....	272
Confectionery	.....	.....	368
Grain Mill Products	1,750	1,040	10,253
Ice, Manufactured	.....	.....	70
Meats and Meat Products	415	.....	1,873
Milk Products	200	.....	2,195
Miscellaneous	1,440	.....	13,902
	$8,766	$1,276	$35,145

Another COMMUNITY REFRIGERATION CENTER Selects Frick Equipment

The Sodus (Michigan) Fruit Exchange processes 60 tons of fruit a day; quick-freezes up to 100 tons; stores 90,000 bushels; operates a locker plant; and sells all kinds of farm machinery, hardware, feeds, and fertilizer.



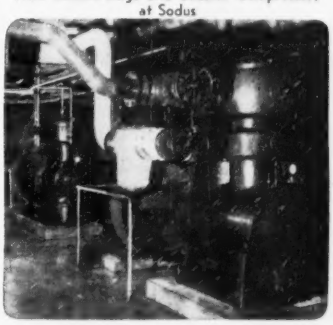
One of Four Frick Blizzard Freezers

Two large Frick refrigerating machines, four Frick Blizzard freezers, and two big cold storage rooms now carry the major load.

Frick refrigerating, ice-making and air conditioning equipment can perform similarly varied services for YOU. Let us demonstrate how today's cooling systems can increase your profits. There are Frick Branches or Distributors in all principal cities.

DEPENDABLE REFRIGERATION SINCE 1882
FRICK CO.
WAYNESBORO, PENNA., U.S.A.
Also Builders of Power Farming and Sawmill Machinery

Frick Second-stage and Booster Compressors at Sodus



★ ★ ★ *Ask Mrs. Homemaker—she'll tell you* ★ ★ ★

"I choose enriched and fortified foods for my family"

AMERICAN housewives enthusiastically endorse the Food Industry's program of enrichment and fortification. More and more, they select *enriched* and *fortified* foods for their family tables.

And their judgment has again been proved correct by the results of the large-scale Newfoundland Nutrition Surveys. These studies reaffirmed that enriched and fortified foods promote *healthier* bodies, sharply reduced infant mortality, lower tuberculosis and over-all death rates — improvement in both the quantity and quality of life.

When you enrich or fortify with Merck Vitamin Products you *know* that the faith of millions of American women is fully protected. Merck Vitamin Products come from the same organization that pioneered in the research and large-scale production of thiamine, riboflavin, niacin, vitamin C, and other important nutrients. And now, the most recent contribution is thiamine mononitrate, a form of thiamine that has the advantage of greater stability in certain food applications.

With the enrichment program, as well as general food fortification, steadily growing in stature, Merck continues to lead in every distinct, forward step.

Merck Vitamin Products for Enrichment and Fortification

VITAMIN B_1
Thiamine Hydrochloride
Thiamine Mononitrate

RIBOFLAVIN
(Vitamin B_2)

NIACIN
(Nicotinic Acid)

ASCORBIC ACID
(Vitamin C)

Merck Enrichment Ingredients for Millers, Bakers, Cereal and Macaroni Manufacturers • Merck Vitamin Mixtures for Flour Enrichment • Merck Bread-Enrichment Wafers • Merck Vitamin Mixtures for Corn-Products Enrichment • Merck Vitamin Mixtures and Wafers for Macaroni Enrichment.

Merck Knows Vitamins

MERCK & CO., INC.
Manufacturing Chemists RAHWAY, N. J.
New York, N. Y. • Philadelphia, Pa. • St. Louis, Mo.
Chicago, Ill. • Elkton, Va. • Los Angeles, Calif.
In Canada:
MERCK & CO. Limited Montreal • Toronto • Valleyfield

Merck Vitamin Products for Enrichment and Fortification

Men, Jobs, Companies

ALFRED N. STEELE has been promoted to the presidency of Pepsi-Cola Co. Previously, he was the company's first vice-president in charge of U. S. sales and operations. Former President Walter S. Mack, Jr., is now chairman of the board.

J. S. ELLITHORP, JR., former executive vice-president of Beech-Nut Packing Co., was recently elected president. He has been with the company continuously since 1917, except for service in World War I. He succeeds W. C. Arkell.

FRANK MURPHY has been named executive vice-president of The Best Foods, Inc. With the company since 1928, he was previously Western sales manager and vice-president. I. C. Bjork now takes over the latter post.

ROBERT G. SPEARS has been appointed vice-president and general manager of the Jelke Good Luck Products Div. of Lever Bros. Co. He is chairman of the executive committee of the National Assn. of Margarine Manufacturers.

Industry

Apple Concentrates, Inc., West Concord, Mass., has opened a frozen concentrate apple juice pilot plant. Production is set at 1,600 gal. per day, using 40,000 bu. of apples to make 750,000 cans of juice.

Borden Co. has acquired the Butterman Ice Cream Co., Inc., Louisville, Ky. No changes in policy are planned and products will be sold under the same brand names.

E. J. Brach & Sons, Chicago, has purchased a 750 x 350 ft. site for a multiple story warehouse. Both ingredient materials and finshed products will be stored there.

Cherokee Rose Dairy, Cornelia, Ga., has scheduled the opening of its cheese manufacturing plant for May 15. Green cheese will be purchased by the Kraft Co.

Coca Cola Bottling Co., Hartford, has been chartered in Dover, Del., with a maximum authorized capital stock of $360,000.

General Mills, Inc. has received bids on a 400,000-bu. addition to the grain elevator at its El Reno, Okla., plant. Project is expected to be completed in time for the wheat movement in June.

The Hancock Coffee Co., New Orleans, has announced plans for construction of a new $500,000 plant and warehouse.

Harshfield Bros., Louisville, Ky., has opened a new general produce prepackaging plant, said to be the first in the Louisville area. First operations are with spinach and kale.

H. J. Heinz Co., Pittsburgh, has awarded a $1,500,000 contract for construction of a new vinegar building. Contract includes loading and storage facilities, railway sidings, and paving work.

W. K. Kellogg Co., Battle Creek, Mich., has awarded a $40,000 grant to the College of Dentistry, University of Illinois, to support development of post graduate dental educational work.

Murray Packing Co., Inc., Plainwell, Mich., has been incorporated for $500,000. Company will engage in the slaughtering and meat packing business.

National Biscuit Co. has announced plans for a new distribution warehouse and office building in Oklahoma City. Company discontinued its manufacturing operations last June.

Pasco Packing Co. is considering construction of a large citrus concentrate plant at Lake Alfred, Fla.

Pepsi-Cola Co. announces election of James W. Carkner as chairman of its executive committee. He has been a director since 1930. William B. Forsythe was named first vice-president in charge of the export department. Also, Herbert L. Barnet was promoted to vice-president in charge of domestic operations.

Peter Paul, Inc., Naugatuck, Conn., announces purchase of a 14½-acre tract in the La Grange Park area of Chicago for a candy plant. The $2,000,000 plant will provide manufacturing facilities for company's full line of candy products.

The Valley Fruit & Vegetable Co., Pharr, Tex., is entering the frozen citrus juice concentrate field. Plans call for erection of a $1,000,000 plant in time for the 1952 season.

Frances Willard Candies, Inc., Columbus, Ohio, has acquired the business of Frances Willard Candy Co. and will continue operations on a manufacturing and wholesale basis. The firm will distribute candies to selected retail outlets, instead of through its own stores as the former company did.

Personnel

James Bruce, former United States ambassador to Argentina, has been elected a director of National Dairy Products Corp.

Arthur S. Davis has been named a vice-president of Dorset Foods, Ltd., Long Island City, N. Y. In the food

Curves make the difference!

R-W "ZIG-ZAG" CONTINUOUS POWER CONVEYOR RAISES PRODUCTION... LOWERS COSTS

In the food industry, the same as every other, the handling of materials is vitally important. And methods of handling frequently determine whether the company makes money or loses money. That's why you should investigate immediately the savings and efficiency you can effect in your plant with the R-W ZIG-ZAG Continuous Power Conveyor system. As shown here, ZIG-ZAG keeps production flowing smoothly, curving in and around, up and down, unrivalled in efficiency and economy. For prompt engineering consultation, without obligation, contact the Richards-Wilcox office most convenient to you. Telephone, write, or wire today.

Engineered for Economy and Flexibility

- Horizontal and vertical units alternate in a continuous chain traveling through special steel tubing.
- Complete flexibility for installation in any plant. Easily installed, easily changed to conform to plant alterations.
- SAFE, SANITARY—all moving parts fully enclosed.
- Low first costs. Low Power Factor.
- Standard horizontal or vertical curves—two-foot radius.

Richards-Wilcox Mfg. Co.
"A HANGER FOR ANY DOOR THAT SLIDES"
AURORA, ILLINOIS, U. S. A. • Branches in all principal cities

1880 RICHARDS WILCOX R-W AURORA 1950
Reg. U. S. Pat. Off.
OVER 70 YEARS

ROBERT C. FERGUSON has been elected president of J. L. Ferguson Co., Joliet, Ill., automatic packaging machinery maker. His father, and company founder, J. Lee Ferguson, continues as chairman of board.

industry since 1911, he previously served in executive capacities with Adolf Gobel, Inc. and Stahl-Meyer, Inc.

Sterling B. Douglas has resigned as chief chemist and director of research for the Leaf Gum Co., where he has been since 1939.

Clarence W. DuBois is now associated with Minute Maid Corp. in Plymouth, Fla. He was formerly with D. K. Tressler & Associates.

Willard Eliel has been elected president of College Inn Products Co., Chicago. Other new officers are Paul F. Tevis, executive vice-president; Gordon E. Carlson, vice-president in charge of production; Frank W. Bering, secretary and treasurer; and H. Russell Searight, asst. secretary and treasurer.

Irving H. Granicher has been elected to the board of directors of the California Packing Corp.

E. B. Lehrack, director and vice-president in charge of sales for Creamery Package Mfg. Co., Chicago, since 1936, has been elected executive vice-president.

Julius Liebman has retired as chairman of the board of Liebman Breweries, Inc. He has been with the company for 64 years.

John J. Madigan has been elected a vice-president of Oscar Mayer & Co., Madison, Wis. He will serve as manager of live stock procurement and general provision operations. P. Goff Beach, E. C. Sloan, William J.

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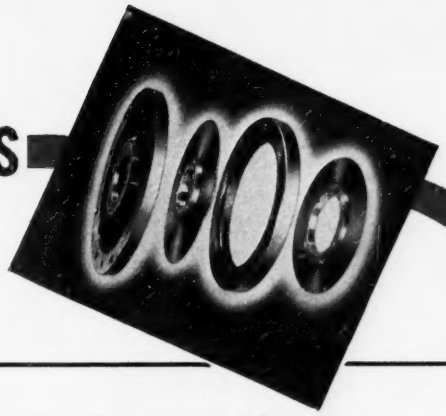


to this

Another exclusive feature of York's 1950 V/W AMMONIA COMPRESSOR

POSITIVE SHAFT SEAL is guaranteed by York's twelve-year performance proved Balanseal. Crankcase gas *stays* tight-sealed!

Balanseal is packless. Dual diaphragms are oil-immersed to reduce friction to the lowest point ever reached in a positive seal. The space within the seal is kept full of oil—automatically.

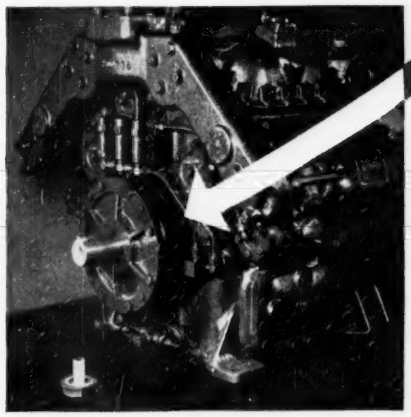
Add to this big exclusive feature the advantages of vibration-free operation . . . compactness . . . flexible operation . . . ease of maintenance . . . and the fact that York's new 1950 V/W Ammonia Compressor *will never wear out* . . . and you'll want the whole story! So better call your nearest York Representative today. He's listed in your directory. York Corporation, York, Pa.

The big advances come from

YORK

Headquarters for— **Refrigeration and Air Conditioning**

balanseal



The new 1950 York V/W Ammonia Compressor is available in 4, 6, 8, 12 and 16 cylinder models. Built-in flexible capacities match every industrial processing need. Operation possible with any prime mover, including steam turbine, permitting use of low pressure steam, or waste steam.

BE SURE YOU GET THESE YORK EXTRAS IN YOUR NEXT AMMONIA COMPRESSOR!

1. LOW INITIAL COST.
2. LOW OPERATING COST.
3. LOW MAINTENANCE COST.
4. SPACE-SAVING COMPACTNESS.
5. SIMPLIFIED MOTORS & STARTING CONTROLS.
6. VIBRATION-FREE OPERATION.
7. FILTERED LUBRICATION.
8. POSITIVE LUBRICATION.
9. POSITIVE SHAFT SEAL.
10. BOOSTER AND/OR HIGH-STAGE OPERATION.
11. COMPLETE NEW LINE.

Meat pans washed and sterilized on Stainless belt

● A nationally-known sausage maker safeguards the purity of his product by washing and sterilizing meat pans on a Cyclone Stainless Steel Chain Link Conveyor Belt. Much manual handling is thus eliminated . . . time and labor are saved . . . costs are lowered . . . high product-quality is maintained.

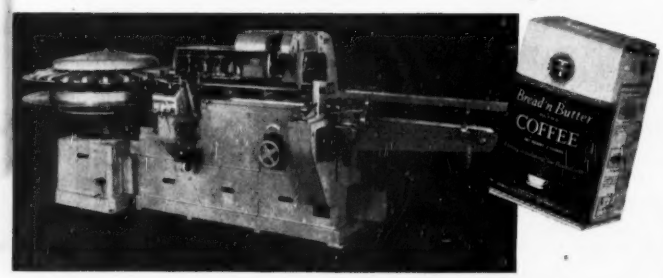
And the results in terms of time, labor and costs can be the same in your plant when you use Cyclone Metal Conveyor Belts for all processing operations. Cyclone has over 25 years of experience in fitting Conveyor Belts to varying requirements.

Write for your copy of Catalog No. 4, containing complete descriptions of Cyclone's three types of belt—Chain Link, Flat Wire and Flex-Grid. Or get in touch with the nearest Cyclone sales office.

CYCLONE FENCE DIVISION
(American Steel & Wire Company)
DEPT. H-50, WAUKEGAN, ILLINOIS
UNITED STATES STEEL EXPORT COMPANY, NEW YORK

USS **CYCLONE METAL CONVEYOR BELTS**
UNITED STATES STEEL

GIVE YOUR PRODUCT *More Sales Appeal*



- The SEALTITE Bag Sealer settles, shapes and seals 2 to 10 lb. paper bags at speeds from 30 to 50 bags per minute.
- A SEALTITE package is ideal for coffee, sugar, salt, flour, starch, cereal or any product usually packed in a paper bag.
- SEALTITE uses *any* standard, gusseted paper bag.
- SEALTITE delivers a square, flat-topped, sift-proof package that stacks like a carton.
- Users report savings up to $500.00 per month per machine.

Write for prices and delivery.

CONSOLIDATED PACKAGING MACHINERY CORP.
BUFFALO 13, N.Y.

BEN W. WILSON, assistant to president of Doughnut Corp. of America, has been appointed director of manufacturing for all the company's plants. He began his career with firm in 1932 as an employee in restaurant division.

Shannon and George P. Shuler have been promoted to assistant vice-presidents.

Allen T. McKay has been elected vice-president in charge of sales at the Dunedin, Fla., juice industries division of Clinton Foods, Inc.

Harry Osterhart has been advanced to the post of general traffic manager of Gerber Products Co.

Hamilton W. Putnam, formerly chemist at Central Laboratories, Colorado Milling & Elevator Co., is now research and development technologist with Ballard & Ballard Co., Louisville, Ky.

George Strauss has been named vice-president of Atmore & Son, Inc., Philadelphia. He will play a key part in the national expansion program of the company.

Richard D. Williams has been transferred to New York as assistant district supervisor of the Fresh Fruit & Vegetable Inspection Service of the Department of Agriculture.

Associated Industry

Aluminum Co. of America's chief of chemical metallurgy, Robert H. Brown, has been chosen by the National Assn. of Corrosion Engineers to receive the Whitney Award for 1950 "in recognition of his outstanding contributions to the science of corrosion."

E. I. du Pont de Nemours Co. has set up a new film department responsible for research, production and sales of

THERMO KING

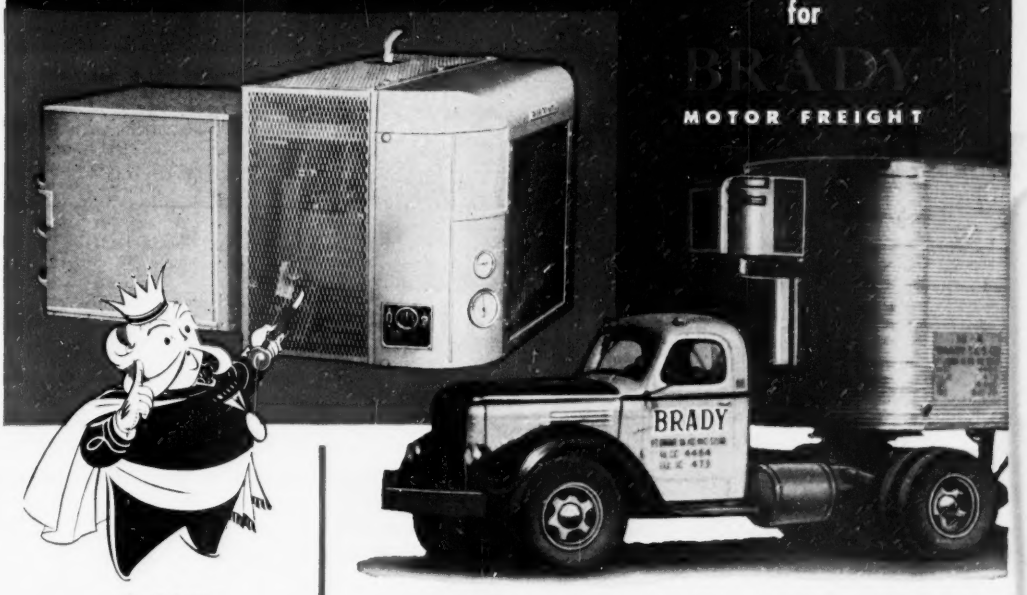
TRUCK REFRIGERATION

PROTECTS PERISHABLES from SPOILAGE—WINTER and SUMMER

for

BRADY

MOTOR FREIGHT



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"Our 36 THERMO KING units enable us to give our customers the very finest kind of protection for all types of perishables, including fresh and frozen meats, eggs, vegetables, poultry, fruit, fish, juices, serum, drugs, butter, etc.

"During summer months, we are able to assure our customers to their complete satisfaction that their perishables arrive at destination in the same condition that they left their plants.

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"We have found THERMO KING to be entirely suitable and plan to enlarge our fleet with more THERMO KING units." —*J. J. Brady, President*
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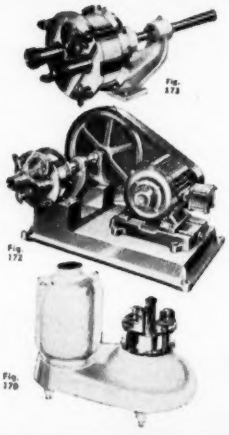
20-35-50-90 G.P.M. SIZES...SOLID DAIRY METAL PUMPS, 3-A APPROVED

FIG. 171 REPLACEMENT PUMP
Fits your older Viking equipment bringing it up to date with the latest 3A approved sanitary pump.

FIG. 172 V-BELT CONVENTIONAL DRIVE UNIT
Complete conventional drive units such as V-belt, gear, flat belt, direct, etc. can be furnished equipped with this Sanitor 3A approved pump.

FIG. 170 COMPLETE "SANITOR" UNIT
The complete Sanitor unit with sanitary motor and v-belt drive enclosed in base with sanitary legs and pull-about casters if desired.



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Viking PUMP COMPANY
Cedar Falls, Iowa

HOMER REPLOGLE has been promoted to newly-created position of vice-president in charge of trade relations for American Home Foods, Inc., New York. He was also elected a director and member of executive committee.

products previously handled by the cellophane division.

General Controls, Glendale, Calif., has started construction on a $100,000 addition to its plant.

Spencer Kellogg & Sons, Inc., will spend $2,000,000 to expand present soybean and freight car unloading facilities at its Decatur, Ill., plant.

Vegetable Growers' Assn. of America has named Paul Dickman vice-president of its marketing section. He is manager of the Ruskin Vegetable Distributors & Co-Operatives.

Wholesale Grocers Assn. of Chicago has elected Nat Holleb president. Coming year's plans call for strengthening the competitive position of the independent grocer.

Deaths

C. Parke Anderson, president of the Lake Byrd Citrus Packing Co. of Avon Park, Fla., and leader in the citrus industry—Feb. 27, of a heart attack in Atlanta, Ga.

Frank H. Douthitt, 71, former president and founder of Douthitt Corp., Chicago—Mar. 17.

Alfred Fiske Pillsbury, 81, director and son of co-founder of Pillsbury Mills, Inc. and former governor of Minnesota—Mar. 12 in Minneapolis.

George Roberts, 63, president of Cape King Fisheries—Mar. 4 in New Bedford, Mass. —*End*

American Can in New York moves to 100 Park Avenue

On May 1st, after many years at 230 Park Avenue, we occupy a beautiful new home in one of the world's most modern office buildings, 100 Park Avenue, at 41st Street.

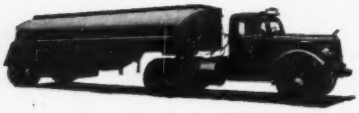
Come and see us

Come by train . . . we're just 1 block south of Grand Central Terminal! Come by plane . . . the airlines terminal is just around the corner! Subway is across the street. Close at hand are America's best-known shops and hotels.

We cordially invite all our friends to visit our new quarters. Don't let the weather stop you: the building is air-conditioned throughout . . . even the sidewalks are steam-heated . . . to keep them clear of snow and ice.

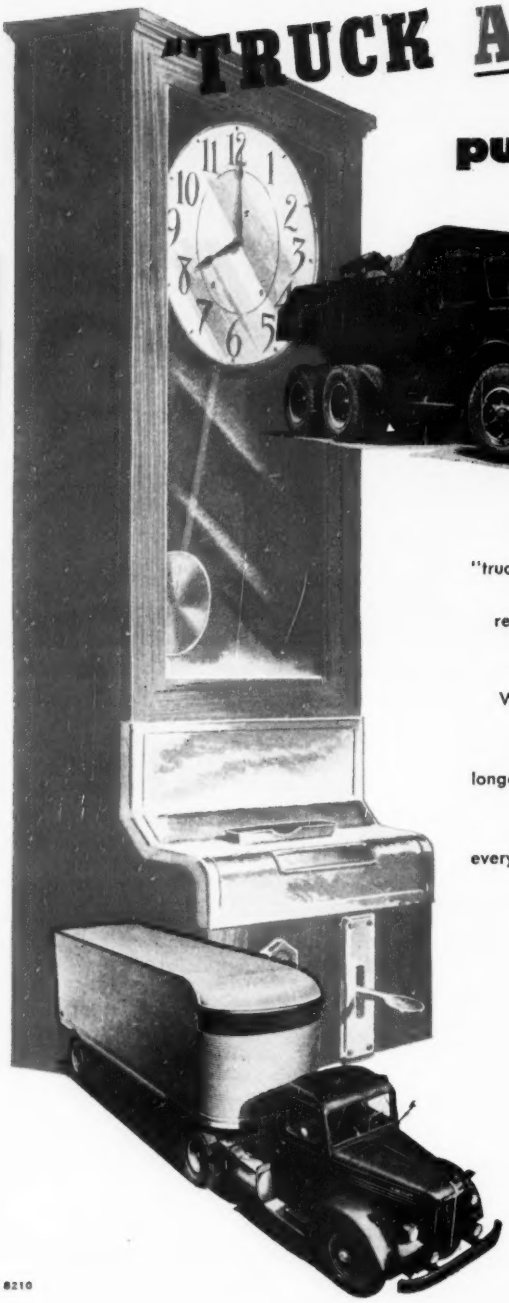
Our telephone number (and the warmth of our welcome) remain the same. Telephone: MUrray Hill 6-4900.

AMERICAN CANCO CAN CO.



...Cut Down "TRUCK ABSENTEEISM"

put MACK TRUCKS on your job



"Truck Absenteeism," like its human counterpart, disrupts the efficiency of your business . . . adds materially to your costs. Actual job records prove that with Mack trucks on the job "truck absenteeism" is reduced to an absolute minimum. That's because Mack trucks have built-in durability . . . extra reserves of strength and stamina. Because they're better built, they're better able to stand up to the demands of hard-working, day-in, day-out service. Work done on the job will always be the one true yardstick of truck value. Figured that way, every Mack truck gives full measure — and more — in round-the-clock dependability; longer, more trouble-free mileage life; sustained earning power; and rock-bottom maintenance costs.

On the job — and on the job records — it proves out every time: "YOU GET MORE WORK *OUT* OF MACK TRUCKS, BECAUSE MORE WORK GOES *INTO* MACK TRUCKS."

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...outlasts them all!

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8210

Books

Later Developments in Milk Processing Are Outlined in Revised Edition

THE MARKET MILK INDUSTRY, 2ND EDITION. *By Chester Linwood Roadhouse and James Lloyd Henderson. Published by McGraw-Hill Co., 330 W. 42nd St., New York 18, N. Y., 1950. 716 pages; 6½ x 9¼ in.; cloth. Price,* $7.

Demand for a second edition of this work has been apparent since the close of World War II. When the first edition appeared in 1941, homogenized milk had not yet been generally adopted. And there have been even more important changes in the nine years, including improvement in pasteurization of milk by high temperature short-time method, synchronization of homogenization and clarification with HTST pasteurization, official checking of holding time of high temp. pasteurizers, improved procedures for preparing cultural buttermilk, and further use of fiber containers in milk distribution.

The book has been revised to include these developments and to offer new information on operation and maintenance of new equipment, on improved processing methods for new products, such as frozen milk and cream, plastic cream, hydrated milk, recombined milk and yoghurt. There are also discussions of new and revised tests for composition and quality of milk products, changes in milk distributing methods, milk plant and equipment depreciation rates and milk pricing plans.

Detergent Chemistry

FUNDAMENTALS OF DETERGENCY. *By William M. Niven, Jr. Published by Reinhold Publishing Corp., 330 W. 42nd St., New York 18, N. Y., 1950. 256 pages; 6¼ x 9¼ in.; cloth. Price,* $5.50.

Food manufacture is certainly one of the industries for which this book was designed. In his thoroughgoing treatment of both the theory and practical applications of detergents, the author attempts to bridge the gap between general and specialized information on the subject.

First, the fundamentals of detergency are discussed, after which these fundamentals are applied to practical processes. Even though laundering is the illustration used throughout, the book does provide the chemical formulation of modern detergents, as well as a ready reference for those with a reasonable amount of training in the theoretical chemistry of the subject. The principles can be applied in all fields where surface tension and related phenomena have a part.

What to Do About Patents

PATENT PRACTICE & MANAGEMENT. *By Robert Calvert. Published by Scarsdale Press, Box 536, Scarsdale, N. Y., 1950. 371 pages; 6½ x 9½ in.; cloth. Price,* $5.

Here is a book on patents that tells the inventor and the executive what to do about them. It undertakes to present applied patent law as the attorney might present it to a client.

The author tells how to obtain a patent, how to use it, how to avoid misuse that would render it unenforceable. But perhaps of even more value, he shows the inventor and the industrial or research executive the importance of accurate record keeping, how to decide what should be patented and when, and how to avoid infringement. Three chapters are devoted to the writing of specifications and claims.

It is a book that should prove highly useful to the researcher in food and chemical engineering.

Cider in English

THE PRINCIPLES AND PRACTICE OF CIDER MAKING. *By Vernon L. S. Charley. Published by Leonard Hill, Ltd., 17 Stratford Pl., W. 1 London, Eng. 367 pages; 5½ x 8½ in.; cloth. Price, 35s.*

This English translation of the French text "La Cidrerie," by G. Warcollier was undertaken, according to Dr. Charley, because no comprehensive work covering the cider industry exists in the English language. The original, published in 1928, reveals the underlying principles involved in cider making and, in the translator's view, little basic material has been published since then.

Dr. Charley does attempt to bring the practical side of the book up to date by adding short sections to the chapters that seem to require a modern note.

The book follows the making of

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OIL OR GAS FIRED

Self-contained unit, shipped complete with all equipment necessary for low cost installation. Exclusive features assure low fuel and maintenance cost. Write for catalog.

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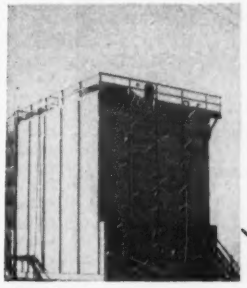

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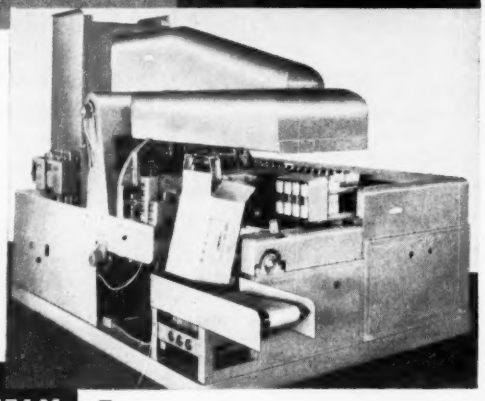
PACKOMATIC fully-automatic shipping case opener-loader, (*right*), forms containers and positions them for receiving assembled packages, then discharges cases, ready for gluer-sealer.



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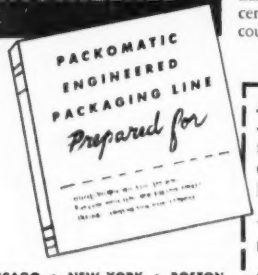

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cider through all its processes and problems, which include utilization of fresh and dried apple pomace and other residues. It is thoroughly illustrated by photographs and tables pointing up the text.

Government Publications

FORMULAS FOR THE COMMERCIAL USE OF WHEY IN BAKERY GOODS. *By L. V. Rogers. Bureau of Dairy Industry, BDIM-Inf-89. Mimeographed.*

FORMULAS FOR MAKING SHERBETS WITH WHEY ON A COMMERCIAL SCALE. *By F. E. Potter, et al. Bureau of Dairy Industry, BDIM-Inf-88. Mimeographed.*

THE MARKETING OF FEED MOLASSES. *By L. John Kutish. Production & Marketing Administration. Unnumbered booklet.*

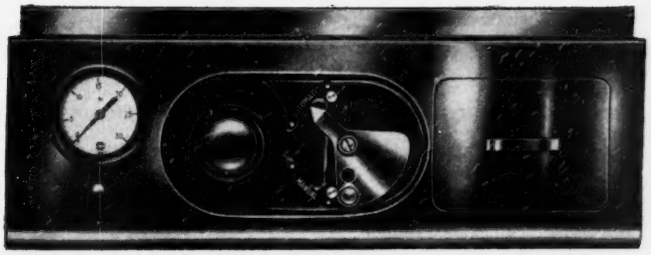
Commodity summaries have been supplied in a series of Bureau of Human Nutrition mimeographed documents dealing with food consumption and family buying habits. Items thus far available from 1948 consumer surveys are: No. 1. MEAT SELECTIONS OF CITY FAMILIES, No. 2. FATS AND OILS CONSUMED BY CITY FAMILIES, No. 3. GRAIN PRODUCTS CONSUMED BY CITY FAMILIES, No. 4. EGGS AND POULTRY IN CITY DIETS, AND No. 5. SUGARS AND SWEETS IN CITY DIETS.

These recently issued documents are available, at the prices indicated, from the Superintendent of Documents, Government Printing Office, Washington 25, D. C. When no price is indicated, the pamphlet is free and should be ordered from the Bureau responsible for its issue.

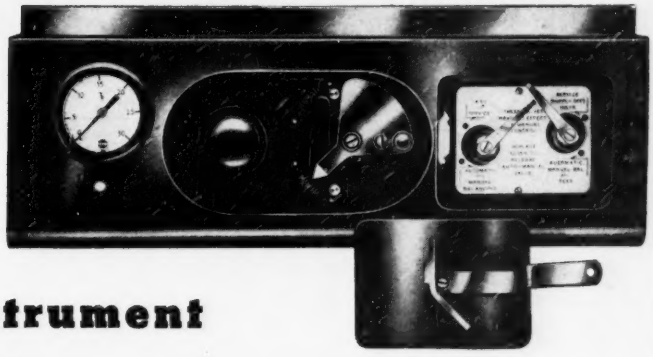
THE CHROMOGRAPH, A NEW ANALYTICAL TOOL FOR LABORATORY AND FIELD USE. *By R. E. Stevens, et al. Geological Survey, Circular 63. Mimeographed.* A device for spot testing on reagent papers where depth of color indicates analytical result.

CROP PRODUCTION: PROSPECTIVE PLANTINGS FOR 1950. *Bureau of Agricultural Economics, Crop Report as of March 1, 1950. Mimeographed.* First basis for estimate of raw material supplies from this crop year.

REPORT OF THE ADMINISTRATOR OF AGRICULTURAL RESEARCH, FISCAL 1949. *Agricultural Research Administration. Unnumbered document. Price 75 cents.* Summary of recent and continuing scientific investigations of Department of Agriculture. —End



No other control instrument



has an external manual-automatic station as mistake-proof as this

***EXCLUSIVE** mechanical interlock prevents switching into wrong position*

***EXCLUSIVE** "balancing" arrangement prevents "bumping" on changeover*

Among the many features which have put the Bristol Series 500 Air-Operated Controller way out front is the unique External Manual-Automatic Station.

1. "Test" and "Service" positions are mechanically interlocked. Operator cannot, by mistake, go *through* "Manual" position into either "Test" or "Service."

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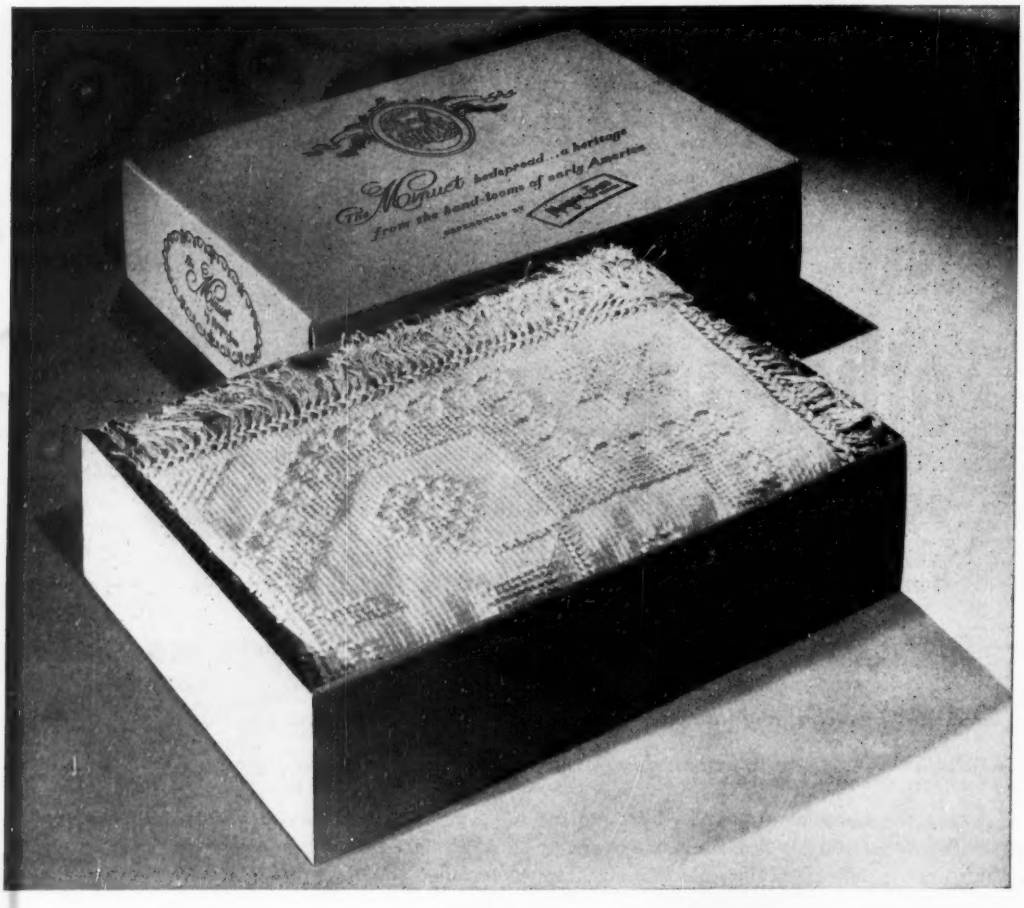

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Catalogs, Bulletins

Food Plant Equipment

Water Jet Eductors A

Complete line of water jet eductors for use in the lifting, pumping, mixing and agitating of liquids and for handling solids and slurries at low cost are described in 36-page Bulletin 2-M. Eductors operate on the jet principle, utilizing the energy of one liquid, usually water, under pressure to cause the flow of another.—*Schutte & Koerting Co., 12th & Thompson St., Philadelphia 22.*

Rubber Linings B

Design, construction and service recommendations are given on rubber-line pipe, fittings, and valves in 8-page Catalog 9780. Specifications and data are listed.—*B. F. Goodrich Co., Akron, Ohio.*

Processing Equipment C

High vacuum processing equipment is presented in 4-page Bulletin 705.—*F. J. Stokes Machine Co., 5900 Tabor Rd., Philadelphia.*

Speed Reducers D

Selection of correct speed reducer is subject matter of Bulletin A-470, which points out relations of factors of horsepower and speed and size of shaft to be driven.—*Dodge Mfg. Corp., Mishawaka, Ind.*

Low-Speed Synchronous Motors E

Construction features, mechanical modifications, and performance data of low-speed synchronous motors are set forth in 8-page Bulletin GEA-5332. Three-phase and 2-phase motors, with ratings from 20 to 15,000 hp. are covered.—*General Electric Co., Schenectady 5, N. Y.*

Air-Cooled Condensers F

Complete data on a new self-contained, air-cooled condenser consisting of a coil, housing, motor and fan are presented in 4-page Bulletin U-177. Operation eliminates need of water.—*Kramer Trenton Co., Trenton 5, N. J.*

Steam-Vessel Converters G

Paracoil converters for steam vessels from 0 to 25 psi. are illustrated in 12-page Bulletin 70. Dimensional data and capacity ratings for 88 standard sizes are included.—*Davis Eng. Corp., 1064 E. Grand St., Elizabeth 4, N. J.*

Mixing Equipment H

Modern mixer designed to cut and mix in a single automatic operation and that provides automatic discharge is described. Thorough blending at full capacity is completed in from 10 to 30 min. with minimum temperature rise.—*Mixers, Inc., 3318 N. Allen St., Philadelphia 34.*

Cooling Towers I

Engineering data on new line of aquatowers is given in 12-page Bulletin AQ-50. Rubber linings in interiors of towers are featured.—*The Marley Co., Inc., Kansas City 15, Kan.*

Cast-Iron Pulleys J

Line of cast-iron pulleys is fully listed and described in 16-page Bulletin 33.—*Sprout Waldron & Co., Inc., Muncy, Pa.*

Evaporator How's and Why's K

The theory, operation and application of the Lo-Temp evaporator, which uses both sides of the refrigerating cycle to produce evaporation, are presented in 8-page Bulletin 175. Evaporator has found extensive use in citrus juice industry.—*Mojonnier Bros., Inc., 4601 W. Ohio St., Chicago 44.*

Choosing a Compressor L

An easy-to-use selector chart highlights new 16-page Bulletin A-56 on compressors. Units are available in 11 sizes, 15 to 125 hp., with piston displacements from 81 to 640 cfm. at 125 psi. maximum.—*Joy Mfg. Co., Henry W. Oliver Bldg., Pittsburgh 23.*

Centrifugal Pumps M

Complete line of single stage, split-case centrifugal pumps are covered in 20-page Bulletin 5810-9. Four pages of pump selection data are featured.—*Fairbanks-Morse & Co., Chicago 5.*

Steam Generators N

Package steam generators for power and process steam in varied installations are described in 12-page Bulletin PG-49-13.—*Foster-Wheeler Corp., 165 Broadway, New York 6.*

Water Softeners O

Recent developments in hot-process water softeners are highlighted in 36-page Bulletin WC-102. Adaptations of softeners to various plant conditions, with respect to such factors as percent make-up, treatment of condensate, and deaeration required, are also included.—*Graver Water Conditioning Co., 216 W. 14 St., New York 11.*

Sump Pumps P

Construction data, applications, and detailed installation drawings of general service sump pumps are featured in Catalog E-748. Pumps are suitable for automatic drainage of pits, basements, and similar constructions.—*Economy Pumps, Inc., Hamilton, Ohio.*

End Labeler Q

Bakers will be interested in 4-page Folder DM650, which illustrates a rotary-type end labeler for bread packages. Operating details, methods of ink transfer, and promotional possibilities are shown.—*American Machine & Foundry Co., 485 Fifth Ave., New York 17.*

Coffee Roasting Method R

Basic facts of patented, low-temperature, rapid roasting method for coffee are described in 20-page Bulletin 23R9.—*Jabez Burns & Sons, Inc., 11 Ave. & 43 St., New York 18.*

Continuous Drum Dryers S

Atmospheric and vacuum type drum dryers for solutions and slurries are illustrated in 48-page Catalog 348. The many aspects of the continuous drying process are particularized.—*Buflovak Equipment Div., Blaw-Knox Co., 1543 Fillmore Ave., Buffalo 11, N. Y.*

Materials Handling

Cup Filler and Capper T

Automatic cup filling and capping machines can handle ice cream, cottage cheese, sour cream, frozen foods, and some canned items. Ice cream packaging units are specifically illustrated and described in 4-page bulletin.—*Anderson Bros. Mfg. Co., Rockford, Ill.*

Corrugated Box Tests U

Booklet, *How to Test Corrugated Shipping*

QUICK SUGAR ANALYSIS

HAND REFRACTOMETER

Pocket-size— designed especially for fruit, vegetable growers, candy manufacturers, canneries, and other food processors. Gives rapid sugar or dissolved solids analysis with a few drops of sample.

Simple to operate, calibrated directly in percentage. Two ranges available

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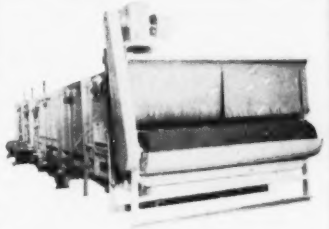

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The new improved Jar Cooler and/or Pasteurizer is just what you need . . . unitized bolted construction . . . automatic feed and discharge . . . made in three widths . . . up to 72 ft. in length (multiples of 12') . . . steel or stainless steel . . . additional sections can be added at any future date.

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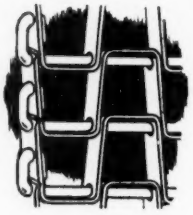

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CONVEYOR BELT CLEANING: (metal, rubber, canvas). Oakite Steam-Detergent Cleaning with the Oakite Gun has it all over laborious manual methods. Cuts cleaning time and cleaning costs to the bone. Informative literature on conveyor-belt maintenance (cleaning, descaling, derusting) yours FREE on request.

for example:

KETTLE CLEANING: (copper, aluminum, stainless steel). Burnt-on deposits on the inside, tarnish on the outside—makes no difference, there are specialized Oakite cleaning compounds designed to remove the most troublesome baked-on deposits quickly, thoroughly, safely. Interesting facts on "beauty-treatment" for kettles yours for the asking.

for example:

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Get MORE for YOUR Cleaning Dollar: If you are interested in getting more for your cleaning dollar make your supply source—Oakite. You can be sure of getting good materials where a little will go a long, long way. You can be sure of getting service . . . in-plant service from a man who knows his job . . . knows where and how to save you money on any cleaning, descaling or derusting need that may arise. So consult Oakite first on "Stem-to-Stern" sanitation. For name of your nearest Oakite Technical Service Representative write address below.

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Boxes, describes the various scientific tests and testing equipment used by responsible corrugated box manufacturers to pre-determine efficiency of these containers in protection of products in shipment and in storage.—*The Hinde & Dauch Paper Co., Sandusky, Ohio.*

Steel Strapping **A**

New 20-page pamphlet, titled *Blue Book of Packaging*, gives complete picture on steel strapping of cartons.—*Gerrard Steel Strapping Co., 2915 W. 47th St., Chicago 32.*

Conveyor Units **B**

Various types of roller, belt, and wheel conveyors for elevating, lowering, and horizontally conveying sacks, cartons, boxes, and bundles are outlined in 24-page Bulletin 63-A.—*Standard Conveyor Co., North St. Paul 9, Minn.*

Fork-Lift Savings **C**

How savings can be obtained through efficient materials handling with fork-lift trucks is illustrated in 4-page pamphlet.—*Towmotor Inc., 1226 E. 152nd St., Cleveland 10.*

Chain Conveyor **D**

A continuous platform-type chain for conveying containers of all types of small products is dealt with in 16-page Bulletin 50-30. Sprockets for use with table chain are also covered.—*Chain Belt Co., 1600 W. Bruce St., Milwaukee 4.*

Turret Trucks **E**

Five models of turret trucks are detailed in 8-page Catalog 1138. Included are working drawings and specifications for this line of horizontal materials handling equipment.—*Hyster Co., Portland 8, Ore.*

Adjustable Truck Platform **F**

Heavy duty truck platform, built into pavement in front of dock, can be adjusted to desired height through use of hydraulic power unit with electric control. Described in 4-page folder and attached Specification Sheet 20, unit is adaptable to existing structures as well as new buildings.—*Rowe Methods Inc., 1743 E. 25 St., Cleveland 14.*

Control Equipment

Polarographic Analysis **G**

Bibliography of scientific papers on polarographic analysis has been prepared for use by research people. References are listed according to date of issue, authors, and subjects in 104-page Bibliography E-90(1).—*Leeds & Northrup Co., 4934 Stenton Ave., Philadelphia 44.*

Mass Spectrometer **H**

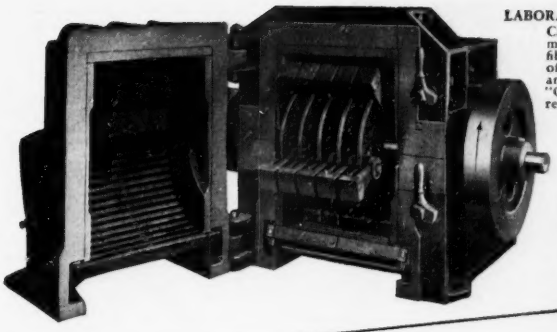
An isotope-ratio mass spectrometer is detailed in 8-page booklet. Application of instrument to use and measurement of stable rare isotopes is outlined.—*Consolidated Eng. Corp., 620 N. Lake Ave., Pasadena 4, Calif.*

Manostat Vac-Pressure Control **I**

Designed for automatic vacuum and pressure control in industry, pilot plant and laboratory, the Cartesian manostat is described in Bulletin CB-97. Diagrammatic drawings provide direction for operation.—*Emil Greiner Co., 20-26 N. Moore St., New York 13.*

Pulp Computing Aids **J**

Pulp density, percent solids, and conditioning times required for given volumes of pulp can be determined quickly using pulp density scale tables. Bulletin S-1-C-B covers pulps ranging from 5 percent solids at sp. gr. 1.40 through 68 percent solids at sp. gr. 3.20.



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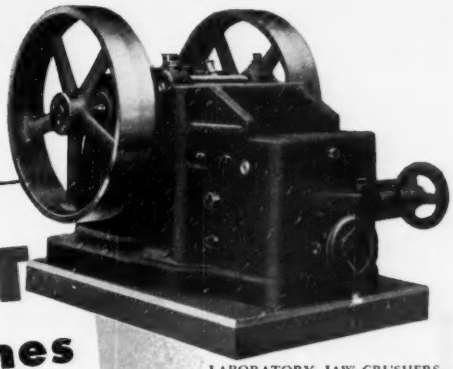

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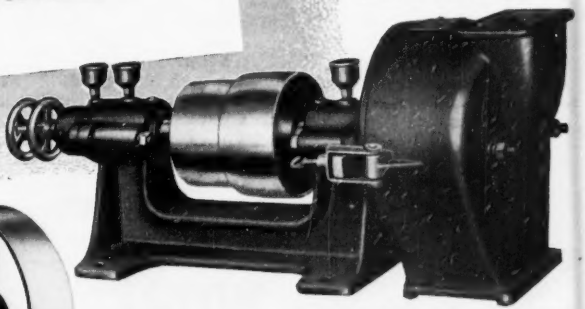

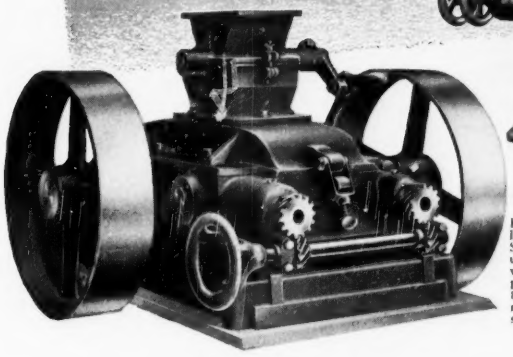

LABORATORY CRUSHING ROLLS

First designed especially for laboratory sampling work, Sturtevant Crushing Rolls are used regularly in many plants where there are limited outputs. Range of output for the 8 x 5 size is from ½ in. to 20 mesh — and for the 12 x 12 size from ¾ in. to 20 mesh.

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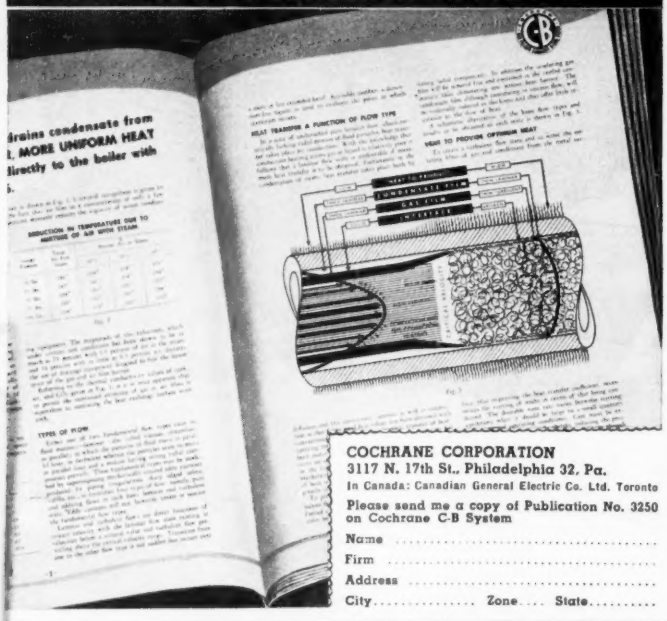

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Bulletin S-1-C-B1 includes 5 percent solids at sp. gr. 1.35 through 68 percent solids at sp. gr. 1.85.—*Denver Equipment Co., Dept. 66, Denver 17.*

Electrostatic Precipitation A

Typical installations and operating principles in electrostatic precipitation are covered in 16-page Bulletin GEA-5212. Method is used for air cleaning, gas cleaning and recovery, painting, deposition, orientation, and separation in connection with small particles of liquid or solid matter.—*General Electric Co., Schenectady 5, N. Y.*

Fluid Density Control B

New line of instruments for measurement and control of fluid density and specific gravity is set forth in 8-page Catalog 76. Available are submerged float instruments for use in vessels under pressure or vacuum, open bubblers, closed diaphragm, and hydrometer types.—*Fischer & Porter Co., Hatboro, Pa.*

Water Stills C

Line of water distillation equipment is shown in 6-page Bulletin 910. Specifications on steam-, gas-, and electric-heat stills are listed.—*Precision Scientific Co., 3737 W. Cortland St., Chicago 47.*

Laboratory Equipment D

Descriptions and prices on line of laboratory equipment, including microscopes, ovens, timers, balances, and blenders, are contained in 16-page booklet, *Lab-Oratory.*—*Schaar & Co., 754 W. Lexington St., Chicago 7.*

Leak Detector E

Typical applications of mass spectrometer leak detector are outlined in 4-page Bulletin LD-40.—*Vacuum-Electronic Eng. Co., 316 37 St., Brooklyn 32.*

Vibration Control Materials F

Characteristics of various types of vibration isolation media—springs, rubber, and cork materials—are given in 4-page Bulletin G-102. A selector chart is featured.—*Korfund Co., Inc., 48-26-A 32 Place, Long Island City 1, N. Y.*

Plant Supplies

Protective Coatings G

Fourteen data sheets on chemical corrosion proofing for metal, concrete and wood surfaces give method of application for protective coatings. Equipment covered includes tanks, fume extraction and air conditioning equipment, structural steel, pipe and gasket material, and food processing machines.—*Bisonite Co., Inc., Buffalo 1, N. Y.*

Liquid Adhesives H

Improved methods of handling and dispensing liquid adhesives to maintain sanitary conditions in the glue room are reported in 4-page folder.—*Williamson Adhesives, Inc., 2327 W. 18 St., Chicago 8.*

Metal Coating I

A new vinyl resin formulation for pretreatment of metal scheduled for water-submerged service is described in data sheet. Material is stated to inhibit corrosion prior to final coating and to provide improved bonding and durability.—*The Dampney Co. of Amer., Hyde Park, Boston 36.*

Aluminum Paints J

Every paint performs differently, depending upon where used. *Painting With Aluminum*, 32 pages, classifies different types of aluminum

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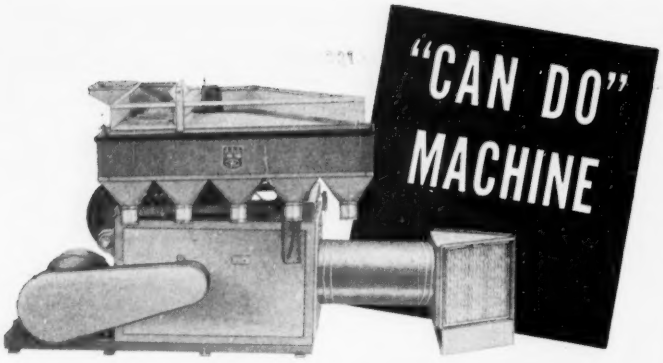

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paint according to the base surface.—*Aluminum Co. of America, 661 Gulf Bldg., Pittsburgh 19.*

Labeling Adhesives **A**

Complete description of different types of adhesives for bottle labeling is contained in 6-page Bulletin 21.—*Paisley Products, Inc., 630 W. 51 St., New York 19.*

Flavoring List **B**

Wholesale price list covering flavorings and aromatic oil materials utilized in food processing is given in 28-page publication.—*Florasynth Laboratories, Inc., 1513-33 Olmstead Ave., New York 61.*

Mechanical Tubing **C**

Bulletin TB-324 outlines advantages of steel tubing, including seamless and welded tubing in carbon, alloy, and stainless steel grades.—*Babcock & Wilcox Tube Co., Beaver Falls, Pa.*

Miscellaneous

Steel-Price Testimony **D**

Special 64-page booklet contains testimony of U. S. Steel Co. officials before the Joint Congressional Committee on the Economic Report. Dealing with company's recent boost in the price of steel, it assigns labor pension settlements as the cause.—*U. S. Steel Corp., 71 Broadway, New York 6.*

Glycerine in Foods **E**

Why Glycerine For Foods? contains information on uses of glycerine in handling and preparing foods and beverages. The 20-page booklet combines technical data with pertinent facts for the non-technical user.—*Glycerine Information Service, Dept. PR, 295 Madison Ave., New York 17.*

Alloy Reference Chart **F**

Six-page folder gives comprehensive data on stainless, corrosion and heat resistant alloy castings. Charted are alloy types and comparative designations of the Alloy Castings Inst., AISI, SAE, and ASTM.—*Cooper Alloy Foundry Co., Hillside 5, N. J.*

Plastic Data Book **G**

Published as a working tool for users of Micarta, as well as designers concerned with this industrial plastic, 3-page Booklet B-3184-D presents technical facts about the material. Grades and forms are tabulated, together with the chemical, mechanical, and electrical properties.—*Westinghouse Electric Corp., Box 2099, Pittsburgh 30.*

Steel Shaft Data **H**

Useful information for determining stresses, torques, bending moments and deflections in steel shafts is given in 20-page Bulletin G-7. Formulas, curves and tables are included.—*De Laval Steam Turbine Co., Trenton 2, N. J.*

Fire Protection **I**

Pocket-sized, 36-page *Fire Hazard Index* lists, in alphabetical order, over 590 chemical, gas, and common fire hazard materials. It then tells which type fire-fighting agent to use on each.—*Randolph Laboratories, Inc., 8 E. Kinzie St., Chicago, 11.*

Watch Your Plant Operations Via TV **J**

Now the food executive can actually see, on a screen located in his office, what's happening in a far off corner of the plant. It's done with "Utiliscope," new wired television equipment described in 16-page Bulletin 1025.—*Diamond Power Specialty Corp., Lancaster, Ohio.*

—*End*

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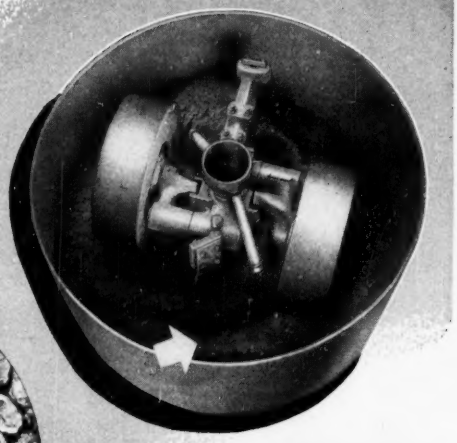

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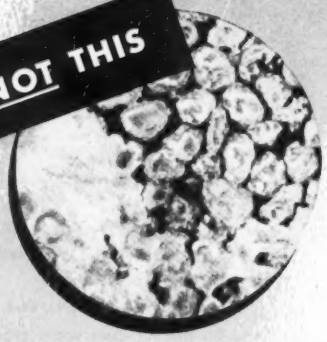

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Patents

Swiss-Type Cheese Coated With Extensible, Flexible, Fluid-Proof Sealing Material, Held at Temperature to Secure Eye Development and Cured in Warm Room Under Controlled Pressure Within Expandible Mold—*J. B. Stine to Kraft Foods Co., Chicago. No. 2,494,636. Jan. 17, 1950.*

Heated Curd for Making Swiss Cheese Kept Submerged in Whey During Emptying From Vat and During Subjection to Mechanical Pressure Until Drained After Holding in Quiet State Until Curd Firmly Knits Preliminary to Curing Into Cheese State—*J. B. Stine to Kraft Foods Co., Chicago. No. 2,494,637. Jan. 17, 1950.*

American-Type Cheese Made by Setting, Cutting and Cooking Curd Preliminary to Draining Off Portion of Whey and Adding Salt to Remaining Mixture of Curd and Whey, Raising Temperature of Salted Mixture, Separating Curd From Remaining Whey, and Applying Pressure to Form Curd Block Preliminary to Curing to Form Cheese—*J. B. Stine to Kraft Foods Co., Chicago. No. 2,494,638. Jan. 17, 1950.*

Salted Peanuts Stabilized Against Rancidity by Use of Ascorbic Acid, Salts of Ascorbic Acid or Its Esters as Inhibitor—*J. T. Owen, Bloomfield, N. J., to Merck & Co., Rahway, N. J. No. 2,494,717. Jan. 17, 1950.*

Onions, and Like, Clipped by Rotary Knife While Held in Carrying Cradles Spaced Around Periphery of Rotatable Wheel—*G. R. Urschel and G. W. Urschel, Valparaiso, Ind. No. 2,494,914. Jan. 17, 1950.*

Coffee Extract Made in a Two-Step Method, With Retention of Aromatic Constituents—*H. Cohen, to Laboratoires Medial S. A., Geneva, Switzerland. No. 2,494,928. Jan. 17, 1950.*

Rice Soaked in Water, Salt, Sugar and Edible Oil in Unsealed Receptacle at Approximately 70 Deg. F. Preparatory to Gradual Heating, Cooking Under Steam Pressure, and Sealing in Receptacle—*T. Hara, Chicago. No. 2,495,001. Jan. 17, 1950.*

Glyceride Fats and Water Subjected to Countercurrent Hydrolysis at High Temperature and Pressure in Presence of Water Insoluble Metal Soap Catalyst for Making of Glycerine and Distilled Fatty Acids—*V. Mills to Proctor & Gamble Co., Cincinnati. No. 2,495,071. Jan. 17, 1950.*

Food With 15 Parts of Cacao Butter Used in Making Cured High Carbon Flexible Rubbery Composition—*S. A. Harrison and R. M. Hill to Firestone Tire & Rubber Co., Akron. No. 2,495,099. Jan. 17, 1950.*

Confection Mix Made to Consist of Granulated Sugar, Powdered Whole, Skim, and Roasted Milk, Powdered Cream, Cocoa, Cream of Tartar, and Flavoring—*M. P. Annarilli, Bridgeton, N. J. No. 2,495,217. Jan. 24, 1950.*

Sugar Solution Decolorized With Active Chlorine Treated at Elevated Temperature With Thermally Activated Bauxite to Remove Returned Color.—*W. A. La Lande, Jr., Upper Darby, Pa., to Porocel Corp., Philadelphia. No. 2,495,334. Jan. 24, 1950.*

Confection Bar Made to Consist of Core of Frozen Fruit, Layer of Hardened Ice Cream, and Thin Layer of Edible Coating and Held at Temperature to Maintain Frozen Condition.—*C. L. Bernards, San Leandro, and R. Bernards and P. Bernards, Castro Valley, Calif., to J. M. Bernards & Sons, Inc., Ashland, Calif. No. 2,495,403. Jan. 24, 1950.*

Foodstuffs Cooked by Exposure to Electromagnetic Wave Energy of Wave Length Falling in Microwave Region of Electromagnetic Spectrum—*P. L. Spencer to Raytheon Mfg. Co., Newton, Mass. No. 2,495,429. Jan. 24, 1950.*

Foodstuffs in Transparent Wrapper Subjected to Electromagnetic Wave Energy for Heating to Predetermined Degree—*A. E. Welch, Weston, Mass., to Raytheon Mfg. Co., Newton, Mass. No. 2,495,435. Jan. 24, 1950.*

Bread Dough Proofed in Open Pan With Removable Bottom, Inverted After Replacement of Pan Cover, and Baked in Open Pan After Removal of Pan Bottom—*R. LeRoy Nafziger, Chicago. No. 2,495,469. Jan. 24, 1950.*

Wort Cooled During Passage Through Plurality of Cooling Stages, Each Stage Represented by Heat Exchange Unit—*W. S. Bonnus, Chicago, to Carrier Corp., Syracuse, N. Y. No. 2,495,625. Jan. 24, 1950.*

Alcohol-Extracted Soya Protein Residue Extracted With Water to Obtain Solution Containing at Least 5 Percent Proteinaceous Material—*L. I. De Voss and A. C. Beckel,*

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Peoria, and P. A. Belter, Pekin, Ill., to United States of America. No. 2,495,706. Jan. 31, 1950.

Solubility of Low-Methoxyl Pectinic Acid Increased by Subjection, in Solid State, to Gaseous Ammonia, at Room Temperature for 30 Sec. to 10 Min.—*H. S. Owens, R. M. McCready, and W. D. Maclay, Berkeley, Calif., to United States of America. No. 2,495,756. Jan. 31, 1950.*

Peanut Meal Particles Recovered From Skins Following Blanching by Subjection to High-Frequency Vibrations During Passage Over Inclined Perforated Frictional Surface—*J. W. Kuehn, Minneapolis, Minn. No. 2,496,009. Jan. 31, 1950.*

Individual Fruits Such as Apples and Oranges Put Into Spaced Relations to Each Other and Fed to Packer by Screw Having Pitch Slightly in Excess of the Fruit Diameter—*W. D. Peel, Oakland, Calif. No. 2,496,019. Jan. 31, 1950.*

Liquids Packaged in Leak-Proof Container Having Open Ends, End Flaps for Closing, and Flexible Closure Membrane Extending Entirely Across Ends—*R. A. Farrell, Menasha, Wis., to Marathon Corp., Rothschild, Wis. No. 2,496,043. Jan. 31, 1950.*

Raw Pineapple Juice Heated to Above Coagulating Temperature of Albumin But Below Boiling Temperature of Juice and Aerated With Minute Gas Bubbles for Removal of Froth Concentrate of Albumin, Fruit Oil and Waxes —*G. M. Eguchi and C. H. Wells to Hawaiian Pineapple Co., Ltd., Honolulu, Hawaii. No. 2,496,202. Jan. 31, 1950.*

Poultry Plucked by Mechanical Action of Helical Spring Into Which Ends of Feathers are Drawn by Flow of Air Through Grid in Fixed Relation to Position of Helical Spring—*J. C. Lanzisera, Brooklyn, N. Y.*—No. 2,496,223. *Jan. 31, 1950.*

Raw Sugar Juice Freed of Ionic Impurities During Passage Through Cation Exchanger and Anion Exchanger Followed by Addition of Phosphoric Acid and Liming—*F. L. Gayle, Lake Charles, La., to American Cyanamid Co. New York City. No. 2,496,244. Jan. 31, 1950.*

Beta-Amylase Crystalized From Juice of Sweet Potatoes—*A. K. Balls and M. K. Walden, Berkeley, and R. R. Thompson, Albany, Calif., to United States of America. No. 2,496,261. Feb. 7, 1950.*

Free-Flowing Powders, Flakes, and Granules of Fruit, Vegetable Juices, Concentrates, Pulps, and Purees Made by Adding Methyl Cellulose as Drying Aid Preliminary to Drying—*C. W. Eddy, Berkeley, Calif., to United States of America. No. 2, 496,278. Feb. 7, 1950.*

Disaccharides Converted to Bionic Acid by Culturing With Pseudomonas Bacteria Without First Splitting by Hydrolysis—*L. B. Lockwood and F. H. Stodola, Peoria, Ill., to United States of America. No. 2,496,297. Feb. 7, 1950.*

Low-Methoxyl Pectins Isolated From Aqueous Solution By Addition of Alkali Metal Salt and Separation of Precipitant.—*H. S. Owens, R. M. McCready, and W. D. Maclay, Berkeley, Calif., to United States of America. No. 2,496,306. Feb. 7, 1950.*

Pantothenic Acid Salts Prepared Synthetically —*E. H. Wilson, Newark, and J. Weijlard and M. Tishler, Westfield, N. J., to Merck & Co., Inc., Rahway, N. J. No. 2,496,363. Feb. 7, 1950.*

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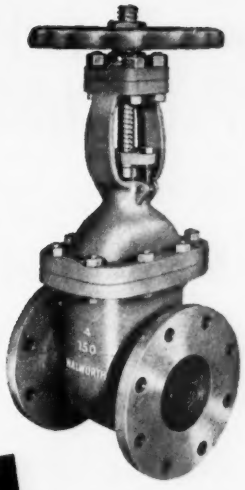

Walworth 150-pound Stainless Steel Gate Valve . . . available in sizes ½ to 3-inch, screwed; ½ to 12-inch, flanged.

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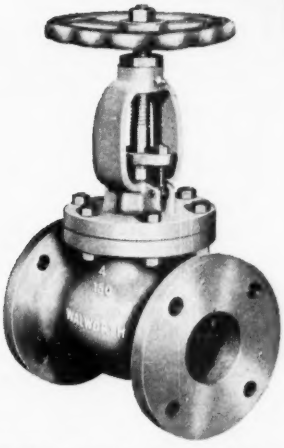
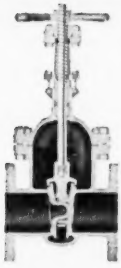


Walworth 150-pound Stainless Steel Globe Valve . . . available in sizes ½ to 3-inch, screwed; ½ to 6-inch, flanged.



Sectional view of Walworth 300-pound Stainless Steel Gate Valve . . . available in sizes 2 to 6-inch, flanged.

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Gate, Globe and Angle Valves have outside screw and yoke construction, thus keeping the stem threads out of contact with the corrosive material in the line. They also have a two-piece bolted gland with ball-type gland follower to prevent binding the stem when packing bolts are tightened. Gland eye-bolts can be conveniently swung out of the way without danger of loss when the gland is lifted for repacking.

Gate Valves have taper seats with a unit consisting of two flat faced discs supported by a carrier on the end of the stem. The discs are of a proven ball-and-socket type. They are free to rotate and adjust themselves to the body seat angles, assuring tight seating with no possibility of sticking in any position.

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New labels for MEAT PRODUCTS containing M. S. G. and H. V. P. must still be submitted to the Meat Inspection Division for approval. Suitable declarations for these ingredients are "Monosodium Glutamate" and Hydrolized Plant Protein". Under the present rulings neither M. S. G. nor H. V. P. need be declared as "Artificial Flavoring".

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Stabilized Nut Butter Made By Applying Heat-Treated Whole Butter to Unground Nuts Prior to Grinding—*G. A. Fisher, Selinsgrove, Pa., to Wm. S. Scull Co., Camden, N. J.* No. 2,496,461. Feb. 7, 1950.

Whole Nuts Roasted, Coated With Substantially Moisture-Free and Heat-Treated Whole Butter and Salted—*G. A. Fisher, Selinsgrove, Pa., to Wm. S. Scull Co., Camden, N. J.* No. 2,496,462. Feb. 7, 1950.

Doughnuts Cut by Spaced Circular-End Heads Mounted on Rotating Shaft—*W. C. Hanson, Fresno, Calif.; one-half to D. R. McKinley, Sacramento.* No. 2,496,468. Feb. 7, 1950.

Asparagus Tips Mechanically Sized and Cleaned—*F. A. Bellato to Bartolomeo Del Carlo, Stockton, Calif.* No. 2,496,516. Feb. 7, 1950.

Dry Macaroni Sticks and Like Automatically Fed to Weighing and Packing Station by Plurality of Horizontal Conveyors Positioned in Tier Relationship and Adapted to Travel at Progressively Increasing Speeds—*V. S. LaRosa, J. Shields, and R. E. Bernier, Danielson, Conn., to V. La Rosa & Sons, Brooklyn, N. Y.* No. 2,496,548. Feb. 7, 1950.

Chocolate Improved by Conching Treatment Consisting of Mechanical Oscillation With Frequency of at Least 15 Kilocycles per Sec.—*Tore Nordenskjold, Malmo, and Knut S. Holmquist, Stockholm, Sweden.* No. 2,496,557. Feb. 7, 1950.

Fruit Solids Separated From Liquid Portion During Passage Under Pressure Through Inclined Tubular Strainer Surrounded by Tubular Casing—*J. B. Orrell, Drexel Hill, Pa., to Abbotts Dairies, Inc., Philadelphia, Pa.* No. 2,496,636. Feb. 7, 1950.

Apples Cored and Sliced in Combination Unit—*J. W. Pease, by W. N. Pease, executrix, Rochester, N. Y.* No. 2,496,637. Feb. 7, 1950.

Ginger Bread Mix Made by Drying Flour to 7 Percent Moisture Content, Concentrating Molasses to Moisture Content Between 4 and 10 Percent, and Throughly Mixing Flour With Concentrated Molasses—*P. W. Salo and L. J. Huber, Minneapolis, Minn., to General Mills, Inc.* No. 2,496,678. Feb. 7, 1950.

Eggs Broken Into 12-Compartment Wax-Coated Carton With Specially Fitting Cover and Frozen for Marketing—*L. Schwartzberg, Chicago, Ill.* No. 2,496,755. Feb. 7, 1950.

Bakery Products Enriched in Vitamin C Content by Addition of Ascorbic Acid in Excess of 10 mg. per 1000g. of Dough—*W. A. Seeder, Zaandam, Netherlands.* No. 2,497,035. Feb. 7, 1950.

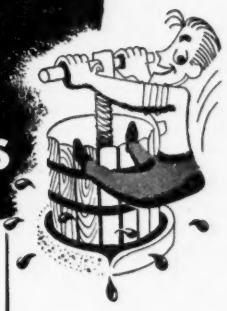
Alkali Metal Phytates Recovered From Corn Steep Liquor and Other Acidic Plant Extracts—*N. E. Artz, Oak Park, Ill., to Corn Products Refining Co., New York City.* No. 2,497,062 and No. 2,497,063. Feb. 14, 1950.

Baked Buns Sliced By Motor-Powered Rotary Knife During Passage Through Feed Chute—*L. Sammy, Gary, Ind.* No. 2,497,187. Feb. 14, 1950.

Butter Packaged in Water-Permeable Sheet of Vegetable Parchment Treated With Mold-Inhibiting Material and Overwrapped With Water-and Moisture-Resisting Sheet—*C. G. Bennett, San Mateo, Calif., to Paterson Pacific Parchment Co.* No. 2,497,203. Feb. 14, 1950.

—*End*

How Fruit Pressers Save Pressing Time . . . increase juice yields with CELITE Pressing Aids

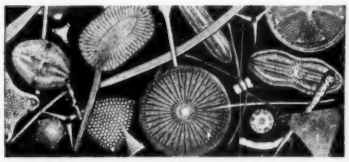


Here is an easy, low-cost way to increase your juice yields, cut down pressing time and save wear and tear on your equipment.

Simply add a small amount of a Celite Pressing Aid to the pulp before pressing.

It works like this:

Celite Pressing Aids are diatomaceous silica powders. The tiny Celite particles, open and porous in structure, interpose themselves between the particles of solid pulp matter, opening up countless channels through which the juice escapes—freely and at lower pressure. More juice is thus extracted in less time. Press slippage is also eliminated, the drier cake is more easily removed and the cloths may often be replaced without the need for washing.



Photomicrograph showing a few of the many varied shapes which make up a Celite Pressing Aid. These minute particles form countless channels for the juice to escape.

Celite Pressing Aids are being successfully used in the pressing of practically all types of fruit products. They require no special equipment. And the saving in pressing time, together with the increase in juice yield and the saving on cloths and other equipment which results from their use generally more than pays for the cost of the small amount of Pressing Aid required.

For further information on Celite Pressing Aids, write Johns-Manville, Box 290, New York 16, N. Y.

WHAT USERS FIND

$3 Bag of Celite Pressing Aid Returns $57.40 Profit

(reported by J-M Engineer H. G. Martin)

Recently, one of my customers asked if we could increase his grape pressing yield.

I added one pound of a Celite Pressing Aid (about ½% by weight of grapes) and stirred it throughout the mass. The mixture was then placed in cheese racks under the hydraulic press.

Previously, the pressing operation had taken 16 minutes. With Celite, the press closed completely, producing a dry cake in nine minutes. Instead of requiring a total pressure of 1100 lbs. pai the press was finished at 600 lbs. pai. There was no slippage of the frames, the cloths cleaned better, and there was no breakage of cloths. In addition to this, the final yield of juice was so much greater that each $3.00 bag of Celite used resulted in an overall profit of $57.40.

One Hydraulic Press Load Convinces Jelly Maker

(reported by J-M Engineer T. A. Feuss)

When I attempted to sell a Celite Pressing Aid to this jelly manufacturer, the thought of putting a filter powder in his fruit to get more juice quicker seemed ridiculous to him.

However, a run was made, adding 1½% Celite to the guavas at the cookers. Observers remarked that they had never seen the press close so rapidly or so far. On emptying the press, the cheeses were quite dry and one laborer could remove them from the cloths because they sheared off by gravity. No cloths or lattices were broken, the juice was noticeably free from suspended mud and the cloths were replaced in the press without washing.

Sales Appeal Improved with Celite

(reported by J-M Engineer W. A. Reschke)

A trial run convinced this customer that he had much to gain by using Celite Pressing Aids in making jelly from frozen grapes.

The equipment used was a vertical hydraulic press. Without Celite, the centrifuges had to be cleaned 3 times a day. With Celite, they required cleaning only once a day. The customer also noted that the cloths were in better condition after pressing with Celite. Production of juice remained about the same, but the jelly was much clearer—it had better sales appeal—and judging from its appearance, a considerably longer storage life could be expected.

These advantages were obtained by the addition of 20 pounds of Celite to each 900-lb. batch of grapes pressed.

Celite Makes Apple Pressing Easier

(reported by J-M Engineer F. D. Richards)

During my first call on this customer, I recommended the use of 2% of a Celite Pressing Aid in their apple pulper.

Recently, when I called again, he informed me of the results. Ordinarily, with the kind of apple they are using at present, the press cake is squashy and slippery. With Celite, the cake is much firmer and they are able to operate the press at a higher pressure. This, according to their estimate, has increased the juice yield by approximately 5%.

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Celite Pressing Aids

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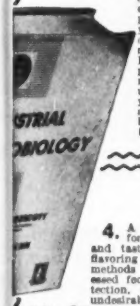

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Packaging for Combat

—Continued from page 79

hazards we know they will encounter in both domestic and overseas shipment.

In addition the laboratory is also equipped with an electronic vacuum-sealing unit with which to seal packages under vacuum, air, or inert gases. Storage and rough-handling tests are conducted after preparation of sealed packages by means of this unit.

There will shortly be available an electronic bar sealing unit for making and sealing bags for test purposes. A commercial bag-making machine and commercial wrapping machine, handling a wide range of materials such as papers, foils, plastics, and combinations of these materials, will soon be installed.

Seams of bags will be made by the application of heat and pressure. The wrapping machine will be equipped with heating plates and one running glue line. Installation of this equipment will enable the laboratory to duplicate commercial production in the laboratory.

Acknowledgment

Acknowledgment of the aid of the Associates, Food and Container Institute, and specifically the activities committee of that group, is expressed at this time. Their counsel and help has supplemented our own endeavors to solve Quartermaster Corps packaging and packing problems. Also available to us in our own endeavors are the results of field tests made by the Quartermaster Board.

The importance of this work is indicated by the decrease in losses of supplies from as much as 70 per cent in the Pacific area during the early stages of combat operations to a 5 per cent maximum by 1945. Results of peace-time studies and developments are to be the means by which even lower losses may be obtained under similar conditions.

—End—

How to Make Chocolate

—Continued from page 82

of the third roll until this "rope" disappears, then tighten until a uniform thin "string" of chocolate reappears in that space—one that does not run off at the ends. This thin string indicates that the machine is "set" at its best.

3. Now look in front of the machine. Very likely the machine is again "sticking out its tongue at you" through formation of a "rope" between the third and fourth rolls. When the third roll was loosened away from the fixed roll, it was tightened up against the fourth roll. The fourth roll must be loosened away from the third until that "jeering tongue" has been withdrawn. To do this, the top roll must first be loosened slightly to make room for the adjustment. Otherwise, it would be too tight and would not let the chocolate pass but would spill it off at the ends.

4. Set the top roll so that the chocolate comes off equally dry all the way across.

For Best Scraping

5. Check the "doctor blade" or scraper to see if it is doing a good job of scraping the top roll clean at all points. If it does not clean the roll at one end, or at any other point, the chocolate will accumulate on the top roll, the roll will heat up, and the operation of the whole refiner will be ruined. Care must be taken to avoid setting the "doctor blade" too tightly against the roll; just tight enough to remove the chocolate. If the blade is badly worn or has hard spots in it, it must be replaced. A 0.035-in. thick blade seems best, once it is worn in. An 0.022-in. thick blade is easier on the finished surface of the roll, but it wears out faster.

6. Check the fineness of the chocolate discharged from the refiner. Test it at two or three points along the doctor blade, by taste or by wetting a little of it with cocoa butter and smearing it on a smooth surface to see the size of the streaks formed by the coarse particles.

7. Set the feed roll so the film of chocolate will be even and the finished product will be of the desired fineness. Where the film is thick, it will appear darker on the rolls. If the film happens to be thick on both ends and thick in the middle of the rolls, the top roll will be found to be too tight and must be loosened slightly. If it is thick in the middle and thin on both ends, the roll at the top is both too tight and it has too much cooling water running through it. Loosen the top roll and reduce the cooling water.

8. Check the temperature of the cooling water discharged from each roll. It should be just tepid to the hand; about 80 deg. F. The surfaces of the rolls will be somewhat warmer but they should never be hot to the hands. If, during operation, a roll gets too hot, it is usually set too tight for the particular paste being refined. It must be loosened; no amount of cooling water can help it.

These directions may seem complicated to the uninitiated. However, a

complete adjustment as described above need only be made once—if the chocolate paste is kept uniform, the refiner room is kept at an even temperature without drafts from open doors, and the cooling water is kept at a uniform pressure and temperature. But failure to maintain these standard conditions usually entails a continuous readjustment of the rolls to meet the changing conditions and results in confusion of the operator and the reduction of quality and production. It pays to condition the room and to circulate water that had been cooled by refrigeration to 55 deg. F. and pumped to the refiner at an even pressure.

Observance of these recommendations in installing the refiner, in uniform mixing of the paste, adjusting the refiner to the paste, and operating the refiner in an 80 deg. F. room and with 55 deg. F. cooling water is quite likely to overcome the difficulty of obtaining chocolate with the desired fineness, "fullness of taste," and soft creamy smoothness.

—End—

Paper Chromatograms

—Continued from page 91

amino acids are usually well separated from each other on a chromatogram.

6. Sulphur amino acids, Cystine, cysteine, methionine, and some of their oxidized products and peptides. They may be recognized by their bleaching action when the paper is sprayed with a solution of platinic iodide (equal parts of 0.17 percent PtCl and 0.83 percent NaI diluted with water at a ratio of 1:10). Sulphur amino acids may also be detected by Feigl's iodine-sodium oxide reaction.

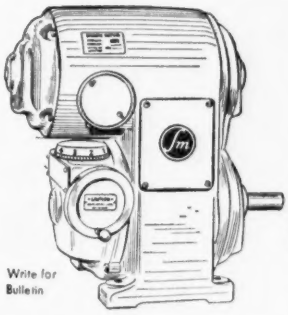
7. Cystine, cysteine, their peptides and other reducing substances such as ascorbic acid. They produce a blue color when the developed chromatograms are sprayed with a freshly prepared solution of Folin's cystine reagent, as described in 1945 by Block and Bolling.**

8. Serine and Threonine, hydroxy-amino acids. They liberate ammonia when treated with periodate. Synge has suggested that, when Nessler's reagent is added to solid periodic acid until the precipitate first formed is just dissolved, the resulting solution may be used to identify serine and threonine.

Use of these specific tests aids greatly in removing ambiguity from the identification of amino acids on

** Block, R. J., and Bolling, D., *The Amino Acid Composition of Proteins and Foods*, C. C. Thomas, Springfield, Ill., 2nd Ed. in press.

THE PERFECT DRIVE



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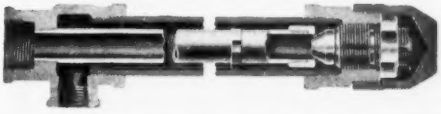

Here is added evidence of the remarkably low maintenance costs of Nicholson expansion steam traps. In the 2 years Bradshaw & Co. have been distributing them in the Pittsburgh area they have installed 444 traps. But they have received not one order for repair parts. And examination of traps in continuous drainage service for at least 18 months, at steam pressures to 250 lbs., showed no sign of valve cutting.

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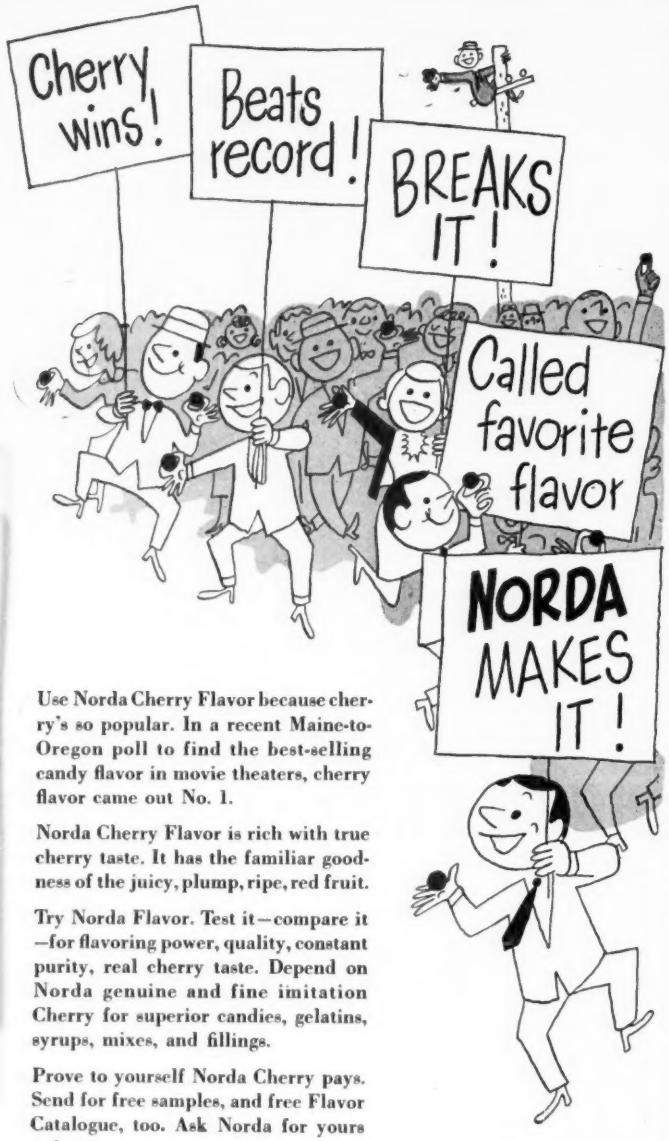

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paper. X-ray and electron diffraction technics on the residue of eluted spots are useful for identification.

Quantitative Tests Made

Although the method of paper chromatography as originally described by Consden, Gordon and Martin was only qualitative or roughly quantitative (±50 percent), a number of quantitative adaptations have been published.

In one of these adaptations, the paper chromatogram is cut so that each substance separated may be extracted with the appropriate solvent and then the concentration of the material in the extract is determined by conventional colorimetry of other means. In another, the materials on the chromatogram are revealed by their own color, by reaction with specific reagents to produce a colored compound, by their microbiological effects when the paper is placed on a suitable test medium or by radioactivity.

In such instances, it has been found (in 1948 by Fisher, Parsons and Morrison) that the area on the paper occupied by each substance is proportional to the logarithm of its concentration. This procedure is very satisfactory when the boundaries of the spots are sharply delineated, but it cannot be applied with accuracy unless this is so, or when the substances are not distinctly separated from each other.

Another Approach

In order to overcome these disadvantages, a third method has been described (in 1948 by Block, in 1949 by Bull) in which the color density is determined continuously or in overlapping increments with an electronic densitometer along the entire length of a one-dimensional chromatogram strip. The color densities, so obtained, are plotted on graph paper, a series of peaks are obtained, and the concentration of each substance or substances is calculated from the area under each density peak.

This procedure is very satisfactory for the determination of substances which are well or partly separated from each other, but it is exceedingly tedious unless automatic equipment is available. Furthermore, as there is no known single solvent which permits satisfactory separation of all or almost all the amino acids present in a protein hydrolysate, preliminary separation by adsorption, ion exchange, or paper chromatograph must be resorted to in many instances.

One of the advantages of the paper chromatogram technic of Consden, Gordon and Martin over the older capillary analysis method of Schoenbein, in 1861, and Goppelsroeder, in 1910, is the two-dimensional chromato-

gram. This method often gives even greater resolution than can be obtained by preliminary separation by adsorption, ion exchange, or large scale paper chromatography followed by one-dimensional strip chromatograph, and it is much easier to conduct. It was reported by Block in 1948 that the concentration of a colored substance on a two-dimensional paper chromatogram can be estimated from the product of the area of the greatest color density times the area of the spot.

We have now found that the concentration of colored substances separated by paper chromatography may be estimated directly on the chromatograms, with reasonable accuracy, either from the product of the area times the color density or more simply from the color density alone. The example given in our accompanying chart is for the estimation of an amino acid. However, equal success has been achieved with non-volatile amines, and it appears that the same principle would apply to other colored substances on paper chromatograms.

Other Substances Determined

Although modern paper chromatography was given its present impetus by the studies of Martin, Synge, and their co-workers on the amino acids, it has been satisfactorily applied to the microseparation of carbohydrates, organic acids, anthocyanins, flavones and other phenolic compounds, purines, pyrimidines, antibotics, metallic ions, and many other substances. In all cases, the general principles are those given above, even though different solvents and other methods of revealing the substances on the paper chromatogram are employed.

—End—

Freezing Time of Meat

—Continued from page 97

by Phillips[15] showing that high air velocities during air blast freezing do not significantly increase the freezing rate of foods.

In addition to supplying information on the effect of air velocity on rate of freezing, the data in Table III show that the package has a profound influence on the freezing rate of meats. As would be expected at all three air velocities used in these tests, the unwrapped meat froze more quickly than the cellophane-wrapped meat, and the cellophane-wrapped meat froze more quickly than cellophane-wrapped meat packed in cartons.

As previously stated, increasing the air velocity to 500 ft. per min. increased the rate of freezing both bare and packaged items. However, this

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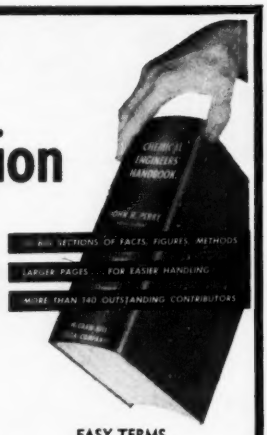
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higher rate of freezing due to increased air velocities was less pronounced on packaged items than on bare items. The time required for the temperature to pass through the critical zone of ice crystal formation (from 31 to 25 deg. F.) was increased as much as 500 percent by packaging.

References

1. Stiles, Walter, *The Preservation of Food by Freezing With Special References to Fish and Meat; A Study in General Physiology.* British Dept. of Scientific & Industrial Research, Food Investigation Board, Special Report No. 7, 186 pages, 1922.

2. Birdseye, C., *Theories and Methods of Quick Freezing. The Refrigeration Data Book, Refrigeration Application,* 2nd ed. pp. 5-10, American Society of Refrigerating Engineers, New York, N. Y., 1946.

3. Meek, G. W., and Greene, V. R. H., Jr., "Evaluating Food Freezing Methods." *Refrigerating Engineering* 53: 391-395, 1947.

4. DuBois, C. W., and Tressler, D. K., Influence of Rate of Freezing and Temperature of Storage on Quality of Frozen Meat. Inst. of Food Tech., Proceedings of 1st Conf. p. 167-179, June 1940.

5. Tressler, D. K., and Evers, C. F. *The Freezing Preservation of Foods.* 2nd ed. pp. 72-110, 1947. Avi Publishing Co., New York, N. Y.

6. Richardson, W. D., and Scherubel, E., "Deterioration and Commercial Preservation of Flesh Foods—General Introduction and Experiments on Frozen Beef. *Jour. Am. Chem. Soc.* 30: 1515-1564, 1908.

7. Hiner, R. L., Madsen, L. L., and Hankins, O. G., "Histological Characteristics, Tenderness and Drip Losses of Beef in Relation to Temperature of Freezing." *Food Research* 10: 312-324, 1945.

8. Moran, T., "Rapid Freezing. Critical Rate of Cooling." *Jour. Soc. Chem. Ind.* 51: 16T to 20T, 1932.

9. Poole, G. "Recent Progress in Quick Freezing." *Refrigerating Engineering* 29: 69-75 and 102, 1935.

10. Plank, R., Uber den Einfluss der Gefriergeschwindigkeit auf die histologischen Veranderungen tierischer Gewebe. Zeitschrift für allgemeine Physiologie. 17:221-238, 1916.

11. Koonz, C. H., and Ramsbottom, J. M., "A Method for Studying the Histological Structure of Frozen Products. 1. Poultry." *Food Research* 4: 117-128, 1939.

12. Ramsbottom, J. M., and Koonz, C. H., "Relationship Between Time of Freezing Beef After Slaughter and Amount of Drip." *Food Research* 5: 423-429, 1940.

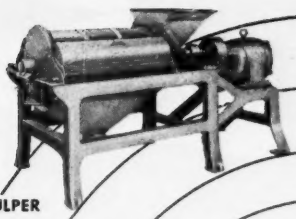
13. Moran, T., "The Frozen State in Mammalian Muscle." *Proc. of Royal Soc. of London, Series B.* 107: 182-187, 1931.

14. Nicholas, J. E., Ziegler, P. T., and Posner, M. C., "Effect of Very Rapid Freezing on Beef Tenderness." *Refrigerating Engineering* 54: 438-440, 1947.

15. Phillips, W. R., "Freezing Rates of Fruits and Vegetables at Various Air Velocities." *Refrigerating Engineering* 52: 401-403, 1947.

Above article is taken from paper presented at research conference of the Council on Research, American Meat Institute, held at the University of Chicago.

—End



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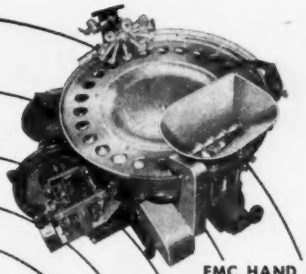

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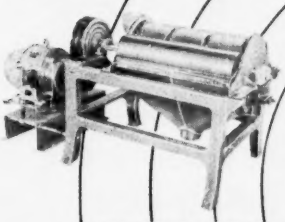

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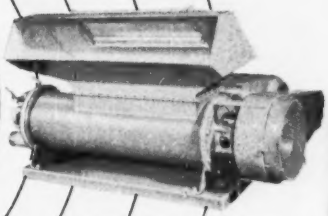

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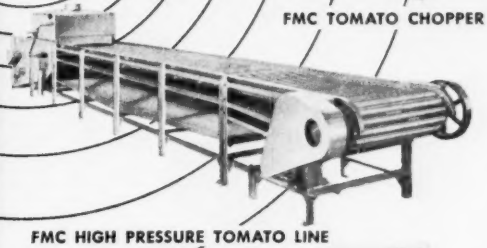

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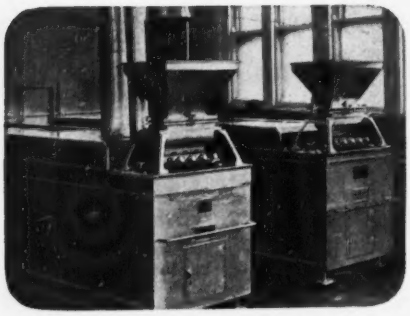

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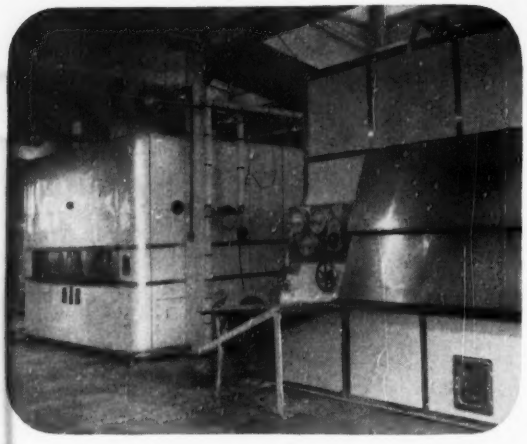

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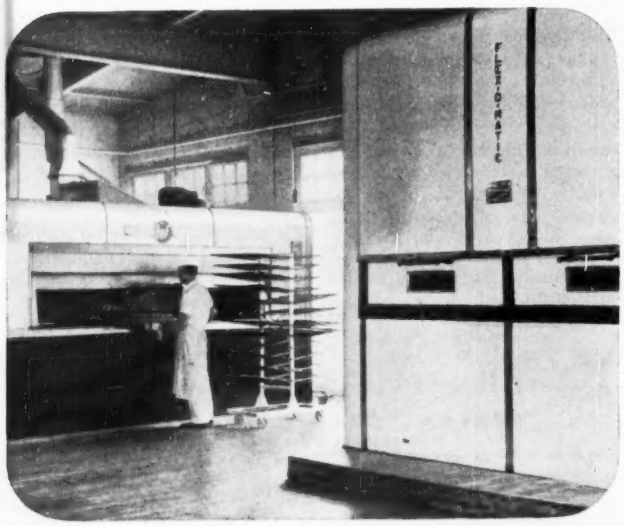

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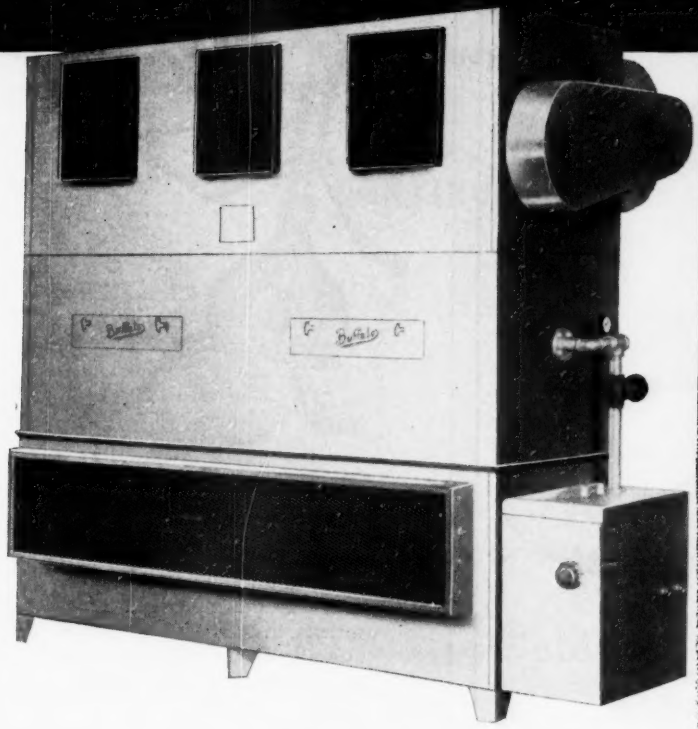

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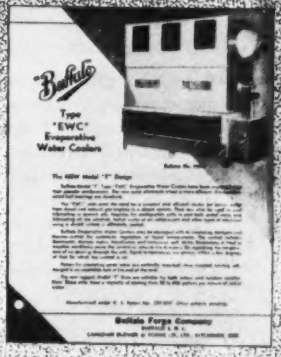

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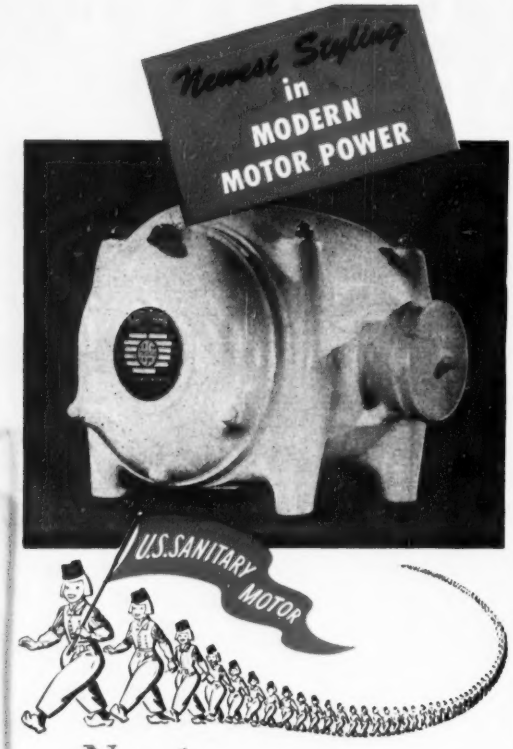

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LOS ANGELES • PHILADELPHIA • ST. LOUIS • SAN FRANCISCO
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added profits

FROM WET RENDERING OPERATIONS with the SHARPLES CONTINUOUS TANKHOUSE PROCESS

HIGHER GREASE RECOVERY

ONE MAN CAN OPERATE THE ENTIRE PROCESS

NO PRESS OR PRESS CLOTHS

ELIMINATES PLANT MESS AND CLEAN UP

ENTIRE CYCLE FROM SLUSH BOX TO DRYER ONLY 20 MINUTES

MAXIMUM PROTEIN SOLIDS RECOVERED

CONVENIENCE IN RUNNING TANK BOTTOMS

HELPS SOLVE POLLUTION PROBLEM

COMPLETE RECOVERY FROM GUT SLIMES AND SEWAGE BASIN SLUDGE

HIGHER QUALITY PROTEIN

NO OBJECTIONABLE ODOR—IN PLANT OR VICINITY

Write today for Bulletin 1251. The Sharples Continuous Tankhouse Process is now in operation in the meat packing industry.

THE SHARPLES CORPORATION

NEW YORK 17, N.Y. • CHICAGO 4, ILL. • BOSTON 10, MASS. • HOUSTON, TEX. • SAN FRANCISCO 5, CALIF. • CLEVELAND 15, OHIO • LONDON • PARIS

ASSOCIATED COMPANIES AND REPRESENTATIVES THROUGHOUT THE WORLD

EXECUTIVE OFFICES AND FACTORY, 2300 WESTMORELAND STREET, PHILADELPHIA 40, PENNA.

America finds a new, easy way to save

Out of the war has come one blessing—a lesson in thrift for millions of those who never before had learned to save.

Enrolled under the Payroll Savings Plan in thousands of factories, offices, and stores, over 27 million American wage earners were purchasing "E" Bonds alone at the rate of about 6 billion dollars worth a year by the time V-J Day arrived.

With War Bond Savings automatically deducted from their wages every week, thrift was "painless" to those wage earners. At the end of the war, many who never before had bank accounts could scarcely believe the savings they held.

The moral was plain to most. Here was a new, easy way to save; one as well suited to the future as to the past. Result: Today, millions of Americans are continuing to buy, through their Payroll Savings Plan, not War Bonds, but their peacetime equivalent— *U. S. Savings Bonds.*

From war to peace! War Bonds are now known as U. S. Savings Bonds, bring the same high return—$25 for every $18.75 at maturity.

Out of pay—into nest eggs! A wage earner can choose his own figure, have it deducted regularly from earnings under Payroll Savings Plan.

New homes to own! Thousands of new homes, like this, will be partially paid for through Bonds wisely accumulated during the next five to ten years.

Keeping cost of living in check! Buying only needed plentiful goods and saving the money which would bid up prices of scarce goods keeps your cost of living from rising. Save *automatically—regularly.*

Weekly Savings	SAVINGS AND INTEREST ACCUMULATED In 1 Year	In 10 Years
$ 3.75	$193.00	$2,163.45
6.25	325.00	3,607.54
7.50	390.00	4,329.02
9.38	487.76	5,416.97
12.50	650.00	7,217.20
15.00	780.00	8,660.42
18.75	975.00	10,828.74

Savings chart. Plan above shows how even modest weekly savings can grow into big figures. Moral: Join your Payroll Savings Plan next payday.

SAVE THE EASY WAY...

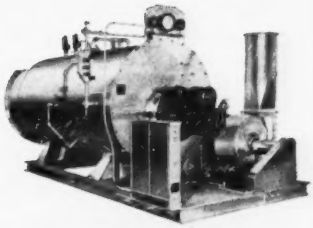
BUY YOUR BONDS

THROUGH PAYROLL SAVINGS

Contributed by this magazine in co-operation with the Magazine Publishers of America as a public service.

Why divide responsibility for a process boiler?

Buy PREFERRED and Lower Steam Costs



THERE'S NO NEED to divide responsibility for a boiler between a half dozen different men. That kind of operation often wastes time, creates confusion, raises costs. That's why more and more engineers look to Preferred. They get *one* unit that's fully coordinated and equipped . . . *one* unit that's ready to generate steam economically.

What's more, they've found that Preferred Unit Steam Generators come through every test with flying colors.

COST OF OPERATION?—These units cut fuel bills as much as 40% . . . and they *keep* repair bills low.

FULLY AUTOMATIC? Yes,—Even with No. 6 oil, including the new catalytic residuals.

NEED AN EXPENSIVE UGLY STACK? *No,* only a simple vent to the outside is required.

COMPACT? Preferred units occupy about half the space needed by ordinary boilers of equivalent output. Headroom requirements are low—saves costly excavations. So you play safe when you specify a Preferred Unit Steam Generator. This factory-completed unit not only simplifies and expedites installation, but also gives you a trouble-free, economical source of steam.

Write for bulletin 1000. It contains complete engineering details of the Preferred Unit Steam Generator and shows you how you can lower your steam costs.

8 PREFERRED "WORTHMORE" FEATURES

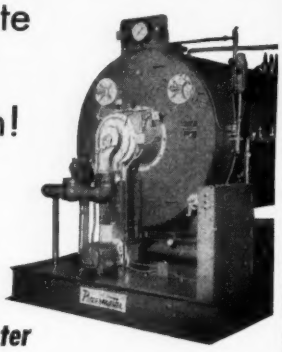
- Preferred-built 4700 rpm Horizontal Rotary Oil Burner—assures fully automatic operation even with No. 6 oil.
- 4-pass, high velocity, gas travel—minimizes tube cleaning maintenance by self-cleaning action.
- Staggered tube construction—minimizes the possibility of tube pitting, even at *low* firing rates.
- Anti-stress deck for tube sheet protection.
- Self-cleaning *induced draft* fan with air cooled shaft and bearings—built to last 30 years.
- Down-draft gas travel for 80% thermal efficiency—proved and guaranteed.
- Special *precipitator* developed by Preferred as aid to safe and clean operation.
- Dual purging cycles for positive elimination of gas stratification.

PREFERRED UTILITIES MFG. CORP. • 1860 BROADWAY, NEW YORK 23, N. Y. FB 150

PREFERRED UTILITIES MFG. CORP.

CUTS COSTS

because it is easy to operate and maintain!



O & S Powermaster gives you cost-saving features like these . . .

1. **FUEL SAVINGS UP TO 30%.** Designed to operate efficiently with inexpensive heavy oils as well as light oils or gas. (Change oil to gas or gas to oil *in 10 minutes!*)
2. **LOW-COST MAINTENANCE.** Swinging rear and removable front covers make cleaning easy — without dismantling burner or controls. Also saves inspection time.
3. **AUTOMATIC OPERATION.** Ignited electrically with gas or light oil. Produces full steam pressure quickly. Operates only as steam is needed.
4. **PACKAGED DESIGN** saves instcllation costs. Delivered fully wired, factory-tested and mounted on steel base. No bricking required.

High and low-pressure units—15 to 300 H.P.—for light oil, heavy oil, gas or combination gas-oil firing. Free catalog mailed promptly—use coupon below.

ORR & SEMBOWER, INC.
Established 1885

Powermaster®
STEAM GENERATORS

ORR & SEMBOWER, INC.
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Please mail latest catalog showing Powermaster's cost-cutting advantages.

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Company_____

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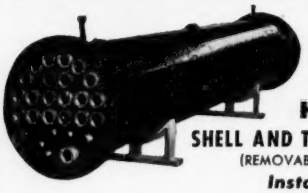
TO PUT THE INDIAN SIGN ON HIGH REFRIGERATION COSTS!



HERE'S HOWE SHELL AND TUBE CONDENSERS
(REMOVABLE TUBE DESIGN)
Install NOW!

YOU SAVE money, space, labor, time, with Howe individually engineered installations, large or small. You get that constant exact temperature and humidity control which in thousands of plants is keeping products at top quality. Howe Shell and Tube Condensers can be compactly grouped in batteries for multiple installations, for any capacity plant. Both shell and tube and shell and coil types for Freon.

OUTSTANDING FEATURES • RETUBING — without special tools • RETUBING — without experienced mechanics • TUBES — standard material purchasable in any locality.

HOWE EVAPORATIVE CONDENSERS save 95% on water, as well as space. Ideal for restricted water areas.

GET THE BENEFITS of Howe's 38 years of practical, test-proved refrigeration knowledge and their ruggedly built, trouble-free equipment. Write for free booklet, or without obligation consult Howe engineers on your specific problems.

SINCE 1912, BUILDERS *exclusively of ammonia and Freon compressors, condensers, coolers, fin coils, locker freezing units, air conditioning (cooling) equipment. Immediate delivery!*

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ICE MACHINE CO.

Distributors in Principal Cities. Cable Address: Himco, Chicago

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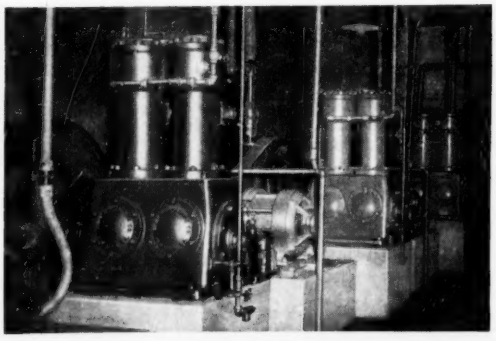
A few territories still open . . . write for details about the HOWE profit-plan for new distributors



Koronet HAIR GUARDS

NOW...

SERVING OVER 50% OF THE NATION'S FOOD INDUSTRIES!

SAVING OVER 70% OF YOUR WOMEN WORKERS' HEADWEAR COSTS!

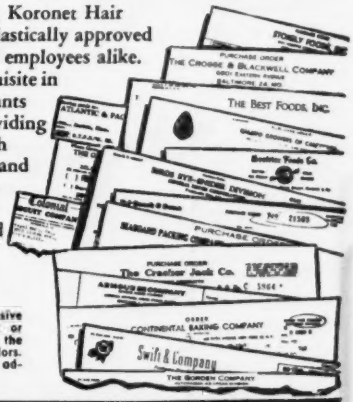
KORONET HAIR GUARDS ARE NATIONALLY FAVORED *Because*

- ✓ They are sanitary. Hair always completely covered—simply, smartly. Permit natural air circulation.
- ✓ They are economical. Cost only a few pennies more than an ordinary hairnet. Neatly webbed of strong durable texture, designed for long service. No laundering, starching or ironing bills.
- ✓ They provide utmost protection. No loose or falling hair. Comply with all provisions of the Pure Food Act. Highly recommended by government food inspectors.
- ✓ They are comfortable. Cool, light, snug fitting, adjustable to any headsize.
- ✓ They are attractive. Flattering with all modern hair styles. Lend pleasing air of uniformity to both plant and employee appearance.

● Wherever introduced, Koronet Hair Guards have been enthusiastically approved by both management and employees alike. They are now a prime requisite in major food processing plants here and abroad. By providing your women workers with this economical, sanitary and attractive product you are performing an essential service for your plant and your employees.

ADVERTISING VALUE!

The KORONET Hair Guard is an exclusive patented product. Any name, trademark or slogan you desire can be imprinted on the shield in your choice of one or more colors. This is an ideal and inexpensive way to advertise your products.

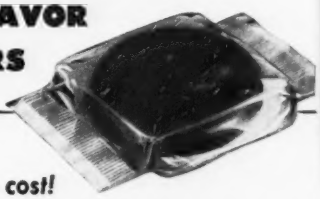


Free Samples! *Take advantage of this offer. Prove to yourself that Koronet Hair Guards are a must for your plant. Write today for FREE SAMPLE, literature and prices!*

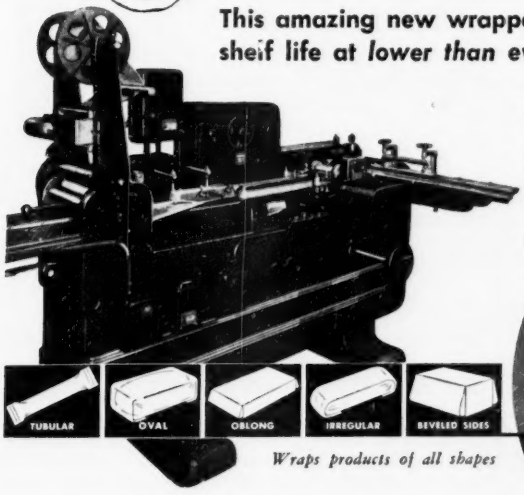
REGAL MFG. CO. 3203-05 ELSTON AVE. CHICAGO 18, ILLINOIS

PRESERVE *OVEN FRESHESS...*

AND YOUR BAKER'S TRUE FLAVOR IN CAKES · COOKIES · CRACKERS



This amazing new wrapper DOUBLES shelf life at *lower than ever production cost!*



Now, you can wrap even your most fragile and irregular shaped products in single or multiple package units *without breakage* — fully glued or heat sealed to keep moisture in . . . dryness out, for "Oven Freshness." No other machine like it! Uses wrapping materials of all types at continuous high speed production of up to 120 units per minute. Cuts material and labor costs, too — Only one operator to feed and one helper to box pack are required. Ideal for numerous bakery products. Write for complete details and illustrated brochure.

Wraps products of all shapes

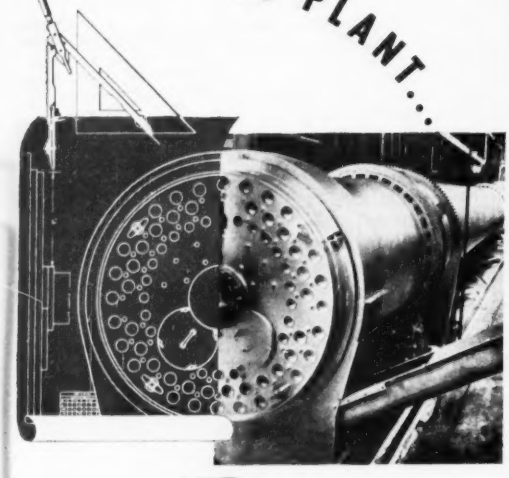
Campbell WRAPPER

HUDSON-SHARP MACHINE CO. · GREEN BAY, WIS.
Manufacturers

New York Office: 55 West 42nd St.

Dryers...

FROM PLAN TO PLANT...



STANDARD

The STANDARD STEEL CORPORATION concept of a dryer sale is COMPLETE service—problem analysis, engineering, fabrication, proper installation and initial operation on the job.

This concept has been given new scope and meaning by STANDARD'S recent acquisition of the Dryer Division of Hersey Manufacturing Company of Boston, the oldest dryer manufacturer in America.

The fusing of these two great organizations creates a fund of dryer experience and engineering know-how unsurpassed in the entire world which can intelligently solve your dryer problem —FROM PLAN TO PLANT.

Send for the new STANDARD-HERSEY bulletin, describing our Continuous and Batch DRYERS, Rotary COOLERS, KILNS and CALCINERS for the Process Industries.

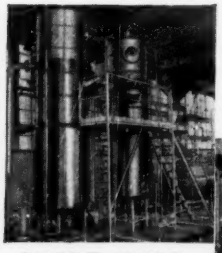
STANDARD HERSEY *Dryers*

STANDARD STEEL CORPORATION

5045 Boyle Avenue • Los Angeles 58, California
Eastern Address: 123-55 Newbury Street, Boston 16

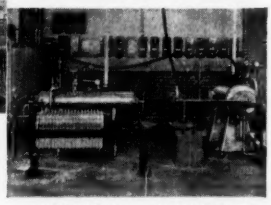
All installations of mojonnier STAINLESS STEEL FOOD PROCESSING EQUIPMENT have one thing in common

. . . They're made for their jobs—with each unit designed to reduce costs and improve quality. *Each installation is treated as a separate problem by Mojonnier engineers. Customer needs are studied and equipment is built and installed to fit the job. Here are typical examples:*



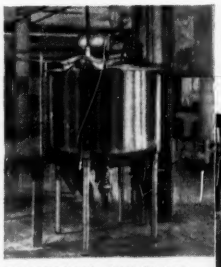
GRAPE JUICE

Mojonnier Stainless Steel Vacuum Fruit Spread Cookers in plant of the Welch Grape Juice Co., San Leandro, Calif.



HONEY...VINEGAR

Two Mojonnier Stainless Steel Tubular Heaters, in plant of I.O.A. Foods, Cedar Rapids, Iowa. The heater, left, is used for processing honey; the one, right, for processing vinegar.



MIXING FOODS

Mojonnier Stainless Steel Single Shell Vat, used to mix variety of food ingredients in plant of I.O.A. Foods, Cedar Rapids, Iowa.

BABY FOODS

Three Mojonnier Stainless Steel Zone-Control Vats used for heating and mixing baby food ingredients. This type vat also can be used for cooling.

For greater economy and quality, consult a Mojonnier engineer now about your processing problem. Write:

MOJONNIER BROS. CO., 4601 W. OHIO ST., CHICAGO 44, ILL.

Other noted Mojonnier Food Processing Units Include:

Lo-Temp Evaporators • Vacuum Pans • Multiple Effect Tubular Evaporators • Germicidal Fruit Scrubbers • Stainless Steel Water Chillers • Tubular Coolers • Bottle, Case, Can, and Quick-Freeze Conveyors • Cold-Wall Tanks • Beverage Carbonating Equipment • Dairy Processing Equipment

MAXIMUM

Freezing Capacity

MINIMUM

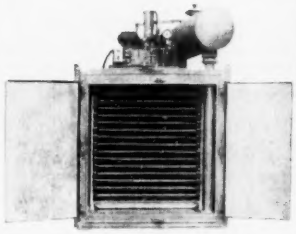
Floor Space

with

Amerio Freezers

(Patent Applied For)

PERFECTED POSITIVE PLATE PRINCIPLE



Model B 15 Stations

38½ sq. ft. floor space
506¼ sq. ft. Freezing Surface

FREEZING OUTPUT

Up to 13,000 lbs. of fruits or vegetables; 16 hour day.

Up to 20,000 lbs. of fish in 16 hour day.

Similar efficiency in meats, poultry and juices.

You can freeze several sizes of packages in the one load.

Name your product; we'll give you freezing time and output.

Amerio Freezers lead in Quality, Speed, Flexibility, Simplicity and Economy. Let us prove it.

For Detailed Data
Send For Illustrated Brochure

AMERIO

Contact Plate Freezers, Inc.

Union City New Jersey

"It's the Contacts that Count"

NATIONAL AIROIL FUEL OIL - GAS BURNERS

THE RIGHT OIL BURNER OR GAS BURNER FOR YOUR JOB

TYPE "SA"
(For use where steam is available) *atomizes thoroughly* and *burns completely*, the lowest and cheapest grades of fuel oil and tar, requiring only low oil pressure and temperatures. Send for Bulletin No. 21.

TYPE "S-A-L"
(Large capacity burner similar to TYPE "S-A-R") is adaptable in combination with powdered coal burners in large boilers. Send for Bulletin No. 24.

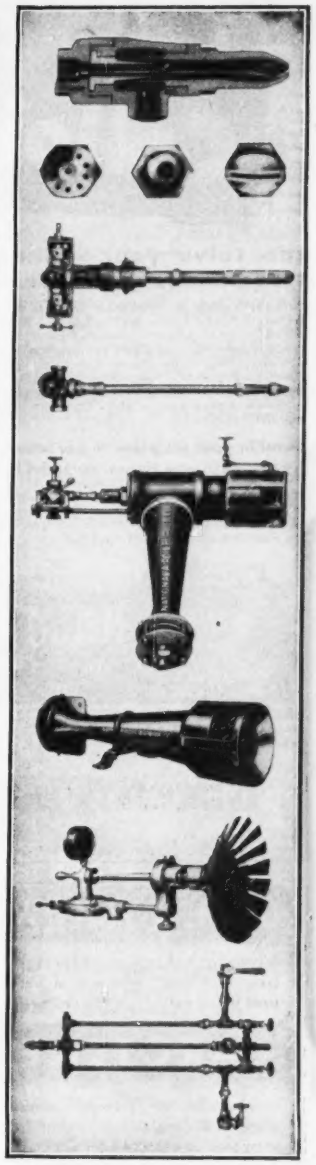
TYPE "S-A-R"
(Where steam, or gas is available for atomizing) safely and efficiently burns residuals obtained from process. Send for Bulletin No. 23.

COMBINATION GAS AND OIL BURNER
—the "AIROCOOL" Gas Burner in combination with a TYPE "S-A-R" Oil Burner. Send for "AIROCOOL" Brochure.

"AIROCOOL" GAS BURNER
(Of venturi type), assures low turndown without burnback. Send for "AIROCOOL" Brochure.

MECHANICAL-PRESSURE ATOMIZING OIL BURNERS
with multi-vane type air diffuser to give a positive swirl to entering combustion air. Send for Bulletin No. 13.

TYPE "S-A-D"
(Refuse Oil Burner) burns acids or caustic oils, sludges, asphalts, tank bottoms, polymer oils, heavy petrolatum organic oil residuums, waste cutting oils, sulphite pulp liquors, etc Send for Bulletin No. 21.



Whether you burn oil, gas or a combination of these fuels, there's a NATIONAL AIROIL BURNER for your job.

Our more than 37 years' experience in the design, development and manufacture of all types of industrial burners is *at your service.*

Ask us about your requirements . . . we'll gladly comply with full information.

OIL BURNERS and **GAS BURNERS** for industrial power, process and heating purposes; **STEAM ATOMIZING OIL BURNERS; MOTOR-DRIVEN ROTARY OIL BURNERS; MECHANICAL PRESSURE ATOMIZING OIL BURNERS; LOW AIR PRESSURE OIL BURNERS; GAS BURNERS; COMBINATION GAS and OIL BURNERS; AUTOMATIC OIL BURNERS,** for small process furnaces and heating plants; **FUEL OIL HEATERS; FUEL OIL PUMPING and HEATING UNITS; FURNACE RELIEF DOORS; AIR INTAKE DOORS; OBSERVATION PORTS; SPECIAL REFRACTORY SHAPES.**

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NEW IMPROVED Colloids

can solve your gelling thickening, suspending, or stabilizing problems

Krim-Ko's uniform, established lines of seaplant derivatives—KRIM-KOgel, KRIM-KOloid, KRIM-KOld, KRIM-KO Tendergel and *CARRAGAR*— have proven remarkably effective and dependable in a wide range of food, industrial and pharmaceutical applications. These proven, uniform colloid agents can be as useful to you as they are to some of this country's largest and most successful manufacturers and processors. Tests have proven that they gel, thicken, suspend and stabilize better than most materials heretofore obtainable. Their dependable uniformity makes them especially easy to use.

Send in your problem to our laboratory—no obligation

Krim-Ko maintains a complete well-staffed laboratory devoted exclusively to the solution of problems in this field. If you have a problem involving emulsifying, thickening, suspending or stabilizing—send it in to us. Our laboratory will make their recommendations in confidence—without obligation or cost. Or if you prefer—we will send you sufficient working samples for your own laboratory. Write today.

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INGREDIENTS for the FOOD PROCESSOR

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GOLDEN YELLOW

Vitamin A Activity characteristic of "June" butter and natural plant materials offered as—

CAROTENE

in vegetable oil, powder, emulsion and crystalline forms. A most economical source of Nature's own palatable

VITAMIN A

Available in several convenient potencies for food and pharmaceutical use. Immediate delivery. Write or wire.

GENERAL BIOCHEMICALS, INC.
60 LABORATORY PARK — GBI — CHAGRIN FALLS, OHIO
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CARROT OIL makes foods golden yellow

Carrot oil, like butter, contains carotene. Carrot oil is extracted from carrots, and each pound contains up to 25 million units of carotene, the international standard of vitamin A.
Carrot oil is preferred for vitaminizing foods because it is a natural vegetable oil, and because it contributes vitamin A of high stability and desirable golden yellow color. Carrot oil is not synthetic, does not contain animal fats of any kind, and does not produce fishy flavor.

SEND FOR BOOKLET

New 36-page combined catalog on carrot oil for foods, feeds, and pharmaceuticals. Important reading for most food processors. Write today!

NUTRITIONAL RESEARCH ASSOCIATES
205 Broad St., South Whitley, Ind.

If this or other advertising does not supply the information wanted concerning materials for the food manufacturer, please write:
FOOD INDUSTRIES

RODGERS
SINCE 1890 - THE BEST ALWAYS

Builders of Equipment for Process Industries.

Batch Mixers	Auger Fillers
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Agitators—Drives	Conveyors—Pumps

Get our quotations and compare.
Ask for our catalog.

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CORROSION-PROOF TANKS & FLOORING

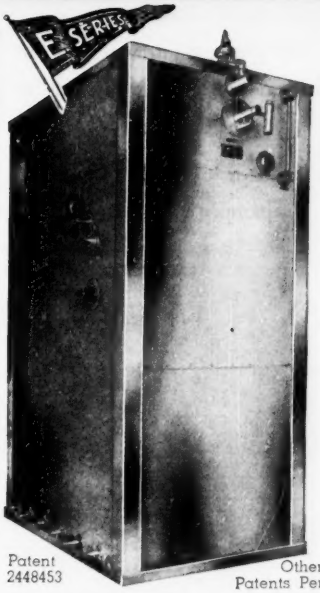
- Corrosion-proof construction of processing and storage tanks; industrial flooring.
- Experience serving major steel, chemical, textile, food plants.
- Complete Facilities: Design . . . Engineering . . . Materials . . . Construction . . . Maintenance.

Write for bulletin giving full data
601 Chemsteel Building, Walnut Street, Pittsburgh 32, Pa.

CHEMSTEEL CONSTRUCTION COMPANY, INC.
Specialists in Acid-Proof Construction

You use Less Water when you use Cold Water

33° ICE WATER will solve your water problems



Patent 2448453 Other Patents Pending

"King Zeero" ICE BUILDER

The New Standard in Sweet Water Cooling

"KING ZEERO" ICE BUILDERS and CABINETS are unexcelled for use for quick cooling of products.

This new standard of sweet water cooling has been set by KING ZEERO Company's leadership in research and original construction.

A "KING ZEERO" installation places tons of ice at your disposal without handling. Ice is formed on the coils with a comparatively small compressor and motor, and melted by the recirculated water used for cooling the product. 32° to 33° ice water is assured.

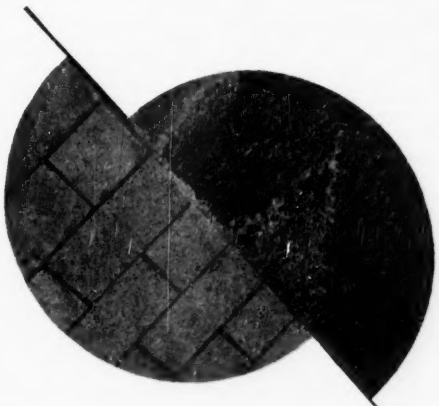
The refrigeration is stored in the form of ice during off load periods.

Available in 46 sizes and models, capacities 1,000 to 13,000 pounds of ice. Can be connected in multiples.

Write for estimates and literature, without obligation.

THE KING ZEERO COMPANY

1447-55 Montrose Ave. — Chicago 13, Illinois



▲ Compare the tile floor joined with ATLAS ALKOR (right) with the ordinary concrete floor (left) photographed after six months of service in a meat packing plant. This photograph has not been retouched.

ALKOR

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MAKES FOOD PLANT FLOORS

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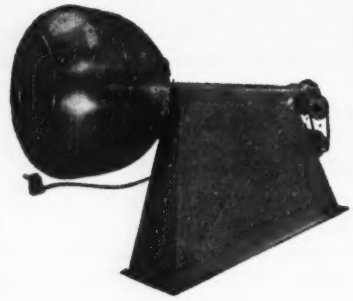

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WANTED

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289-10th ST., BKLYN 15 N. Y.

FOR SALE—DRYER

One revolving rotary vacuum dryer, 4 ft. Dia. x 14 ft. long, stainless clad, jacketed for 50# per sq. in. Drum can be used for vacuum drying and hot air drying. Excellent condition.

THE NESTLE COMPANY, INC.
New Milford, Connecticut

These advertisements

are live opportunities in the field of food processing and distribution.

Each announcement represents a current Want or Offering of an organization or individual in the field, with some element of profit in each for whoever can fill the need. Some have money-saving possibilities, others are opportunities for more business; many are employment opportunities; still others offer property, or equipment—used or surplus new equipment.

"Searchlight" advertisements are constantly changing. New opportunities are constantly finding their way into this great Want medium, each issue. Regular reading of the "Searchlight" pages can be as important to you as reading the editorial sections; Editorial matter is NEWS OF OPPORTUNITIES offered in the industry.

for EVERY business WANT "Think SEARCHLIGHT first"

FOR SALE—MODERN PACKAGING EQUIPMENT

LATE MODEL

PNEUMATIC SCALE CO. 35 Per Minute.
AUTOMATIC CARTONING LINE Automatic Feeder, Bottom Sealer, Liner, Filler, Top Sealer & Compression Unit.

PNEUMATIC SCALE CO. Medium size, Double Package Makers
PNEUMATIC SCALE CO. 16 spout stainless steel fully automatic Vacuum Filler
KARL KIEFER 16 spout rotary Vacuum Filler
PNEUMATIC SCALE CO. Tightwraps
PNEUMATIC SCALE CO. Wax Inner Liner
PNEUMATIC 4 Scale Net Weight Filler
PNEUMATIC Top Tucker for Cartons
PNEUMATIC Automatic 4 Head Capper
PNEUMATIC Single Head Automatic Capper
CAPEM 4 Head Automatic Capper
RESINA Automatic Cappers
FILLER MACHINE CO. 2 and 4 Spout Stainless Steel Piston Fillers
PACKOMATIC Cartoning Unit, 8" and 12" sizes. Bottom Sealer, Filler and Top Sealer.
STOKES & SMITH Model G Auger Fillers
TRIANGLE Top and Bottom Carton Sealer with Compression Unit. For large size cartons.
CECO 12" Adjustable Top & Bottom Carton Sealer
STANDARD-KNAPP 429 Top & Bottom Case Sealer
WORLD fully automatic Straightaway Labelers for front and back labels. 60 and 120 per min.
WORLD Automatic Rotary Labeler
STANDARD-KNAPP, BURT Can Labelers
N J Pony Labelrite Labelers, Model ML, MX
NATIONAL, WORLD, ERMOLD Spot Labelers
PACKAGE MACHINERY CO. F-6 & F-8 Wrappers
POWDER MIXERS & SIFTERS 200 to 1000 lbs.
PROCTOR & SCHWARTZ 14 Tray Shelf Dryer
COLTON Tablet Machines, Model 3DT
LEHMAN 12"x24" 3 Roller Granite Mill
CHAMPION Wire Stitcher

WANTED
Single Machines or Entire Plants

ALLIED EQUIPMENT CO.
940-946 Nepperhan Ave., Yonkers 3, N. Y.
Phone: Yonkers 5-0442

EQUIPMENT
FOR FOOD AND PROCESS INDUSTRIES

1—Louisville Stainless Steel experimental Rotary Steam Tube Dryer 12" x 6'4".
3—Louisville Rotary Steam Tube Dryers 6' x 50'.
1—Stainless Steel Jacketed Kettle, 220 Gallons.
1—Acme Stainless Steel Jacketed Kettle, 100 Gallons.
2—Buflovak Double Drum Dryers, Chrome-Plated Rolls, 32" x 90" and 32" x 100".
2—Selectro enclosed Vibrating Screens, 18" x 48" Chrome-Plated.
1—Orville-Simpson Rotex Screen.
2—Pfaudler Aluminum Jacketed Reactors, 250 & 1300 Gallons.

R. GELB & SONS, INC.
UNION, N. J.
Est. 1886 UNionville 2-4900

WE CAN FURNISH AT ANY POINT NEW AND USED TIGHT AND SLACK BARRELS AND STEEL DRUMS, PAILS AND KITS. LET US HAVE YOUR INQUIRIES.

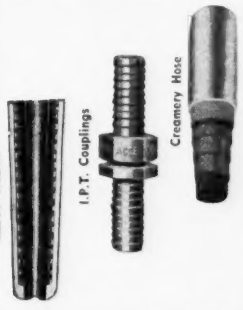
BUCKEYE COOPERAGE CO.
3810 Orange Ave., *EXpress 3383*, Cleveland 15, O.

FOR SALE
Purchased new recently, 1 URSCHEL DICER and STRIP CUTTER, Model "L" for ⅜" cuts, complete with splashproof 2 H.P. Westinghouse motor and Urschel Honing Machine. We paid $1,400.00, willing to sell for $1,200.00.
WYLER & COMPANY
1050 Fullerton Ave. Chicago 14, Illinois

CARLYLE
INDUSTRIAL RUBBER PRODUCTS FOR EVERY PURPOSE
IMMEDIATE DELIVERY OF CONVEYOR, ELEVATOR AND TRANSMISSION BELTING — FIRE, WATER, SUCTION, AIR, STEAM AND WELDING HOSE

FOOD PRODUCTS AND CREAMERY SANITARY HOSE

White Cones—Black Tube.



For washing down, cleaning and sterilizing of equipment in Creameries. Meat Packing Plants, Cheese Factories, and all Food Processing Plants.

WHITE COVER that resists abrasion and the destructive action of grease, milk and animal fats.

BLACK TUBE that is steam and hot water resistant.

STURDY CARCASS of 4 ply heavy cotton duck.

Couplings furnished are I.P.T. Long Shank.

STOCK #_CH302A I.D. Size & Length	Without Couplings	With Male and Female Couplings Attached	Female Coupling & Built on Rubber Nozzle
½" x 25 ft.	$8.00	$9.25	$10.70
½" x 35 ft.	11.25	12.50	14.00
½" x 50 ft.	16.00	17.25	18.75
¾" x 25 ft.	9.50	11.00	12.50
¾" x 35 ft.	13.25	14.75	16.25
¾" x 50 ft.	19.00	20.50	22.00
1" x 25 ft.	13.50	15.25	16.75
1" x 50 ft.	27.00	28.75	30.25

Extremely low prices.
Freight prepaid to destination.

CARLYLE RUBBER CO., Inc.
62-66 Park Place, New York 7, N. Y.
Phone: Digby 9-3810

FOR SALE
Two vacuum machines, Beach-Russ—2D with one H.P. motor, our cost $209.00; Beach-Russ #100D with 5 H.P. motor, our cost $1147.00. These machines were purchased in 1948 and were used only six months. They are in excellent condition. Any reasonable offer accepted.
SUPERIOR CHEESE COMPANY
P. O. Box "D" Green Bay, Wisconsin

$ FOR SALE—NEW SWENSON MONEL EVAPORATOR, PFAUDLER 200 GALLON JACKETED & AGITATED GLASS LINED REACTOR, STANDARD KNAPP #429 GLUER, SEALER, & DATE CODER, YORK 72 TON - 75 HP COMPRESSOR - FITZPATRICK 8/8 MILL
SEND FOR BULLETIN #151
CHEMICAL & PROCESS MACHINERY CORP.
146 Grand St. New York City 13
WORTH 4-8130

"Consolidated"
HEADQUARTERS FOR UNUSUAL SAVINGS

3—30"x30" Aluminum Filter Presses: for either 32 or 48 chambers each; 1" cake side feed, open delivery, non-washing. Used on pectin. Two Shriver and one Sperry.

5—Shriver Rubber covered Filter Presses: 36"x36", 36 & 18 chambers, 1½" solid rubber plates, 3" cast iron rubber covered frames, 4 eye, closed delivery.

1—6'x60' Louisville Rotary Steam Tube Dryer: New, unused welded shell and tubes, 27—4½" tubes and 27—3" tubes.

2—Stainless Steel Rotary Dryers: 6'x40' Ruggles-Coles, for either hot air or direct heat.

1—Std. Knapp #429 auto. top & bottom Gluer-sealer, self adjusting, with compression unit.

8—Day Powder Mixers, up to 2,000#.

2—Stokes & Smith GI Powder Fillers, M.D.

2—World Rotary Automatic Labelers.

1—2000 gal. Steel, jacketed Kettle, open top, Agitated, 7" dia. x 7'6" deep.

1—Rotary Vacuum Dryer, 5'x33'.

8—Baker Perkins Size 15 Mixers, jacketed, 100 gal.: 1 size 16 unjack.

1—#12 Sweetland Filter, 4" centers, iron or copper leaves.

2—Pkge. Machinery Type F9 Cellophane or Wax Wrapping Machines.

60—40, 60, 80 gal. Aluminum steam jack. Kettles, 40 p.s.i. working pressure guaranteed.

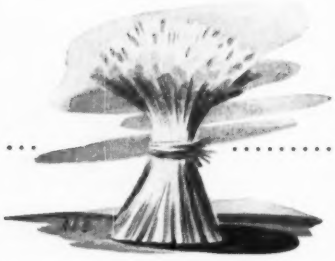
20—250 Gal. Copper, jack. Kettles, open top, with stands, 50" dia. x 42" deep.

ONLY A PARTIAL LIST

THE KEY TO SAVING TIME AND MONEY
CONSOLIDATED PRODUCTS COMPANY, INC.
13-17 Park Row New York 7, N. Y.
We buy your Idle Machinery

ONE OF A SERIES DEMONSTRATING APPLIED LUKENOMICS

MIX MAGIC . . . or how quality and price appeal can be mixed into a product to make it click



A leading bakery, to increase profits through improved quality and reduced maintenance, installed new-type dough mixers. Their design incorporates agitators, with special air seal to eliminate packing around the shaft, and insulated stainless-clad steel bowls. These modern mixers assure thorough, quicker mixing, ease of cleaning, sanitation, better heat transfer and close temperature control. Streamlined contours improve appearance and reduce maintenance. Result: silky white doughs of uniform grain and texture with fine gluten development and highest absorption . . . a big boost in sales for top quality bakery products.

In many other food processing applications—where sanitation and eye appeal are musts—modern-design, efficient equipment does the job better for less, assuring a greater margin of profit. The all-out combined efforts of the designer, engineer, fabricator and materials supplier have helped solve many equipment problems. Such close cooperation Lukens calls *Lukenomics.*

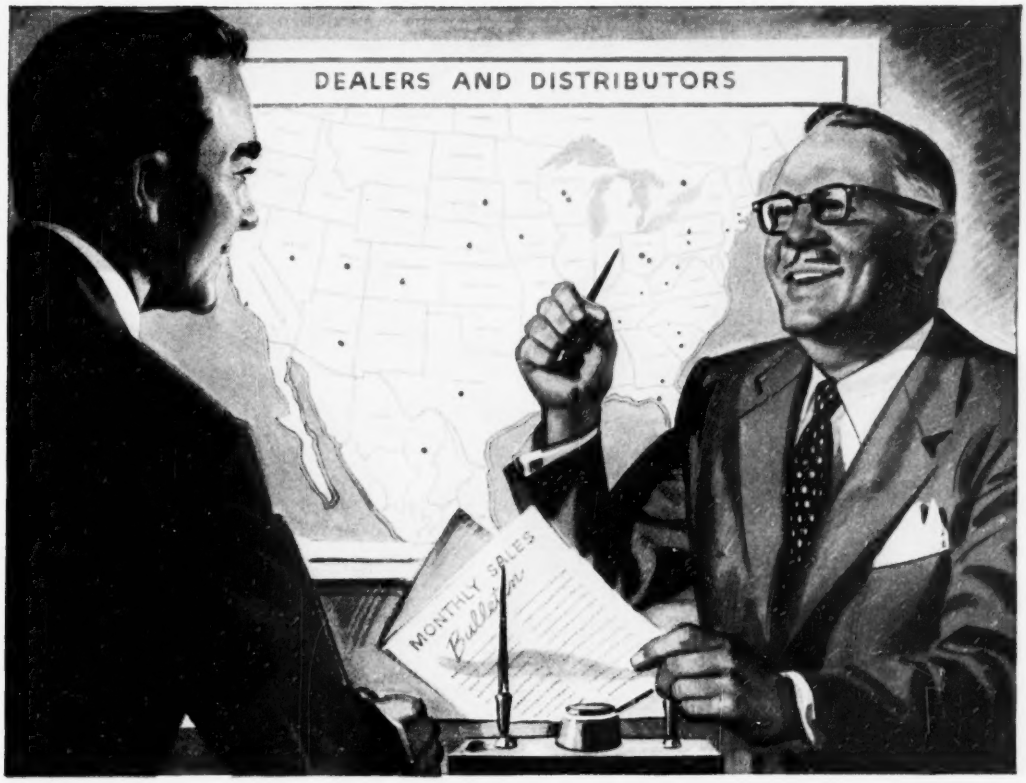
To obtain the advantages of equipment made by fabricators applying the Lukenomics principle, write our Manager of Marketing Service, Lukens Steel Company, 401 Lukens Building, Coatesville, Pennsylvania.

The bowls of these high-speed dough mixers, such as shown, are made of Lukens Stainless-Clad Steel.

LUKENS

LUKENS STEEL COMPANY

BETTER PRODUCTS FOR BETTER EQUIPMENT



PROPER PACKAGING Is the Key to Better Customer Relations . . .

The esteem in which you are held by your customers is one of the most valuable assets of your business. The danger of aggravating customers with damaged goods, and jeopardizing this esteem, can be largely eliminated by using the right box for your product.

Permit Gaylord to analyze your present shipping container to see how it can be improved to do a better job of protecting your merchandise *and* your good will.

CORRUGATED AND SOLID FIBRE BOXES • FOLDING CARTONS • KRAFT BAGS AND SACKS • KRAFT PAPER AND SPECIALTIES

GAYLORD CONTAINER CORPORATION General Offices: **SAINT LOUIS**

New York • Chicago • San Francisco • Atlanta • New Orleans • Jersey City • Seattle
Indianapolis • Houston • Los Angeles • Oakland • Minneapolis • Detroit • Jacksonville
Columbus • Fort Worth • Tampa • Cincinnati • Dallas • Des Moines • Oklahoma City
Greenville • Portland • St. Louis • San Antonio • Memphis • Kansas City • Bogalusa
Milwaukee • Chattanooga • Weslaco • New Haven • Appleton • Hickory • Greensboro
Sumter • Jackson • Miami • Omaha • Mobile • Philadelphia • Little Rock • Charlotte

Gaylord Boxes

DIESELS RUN CLEANER...

...and fuel costs are less when you lubricate with Texaco Ursa Oils

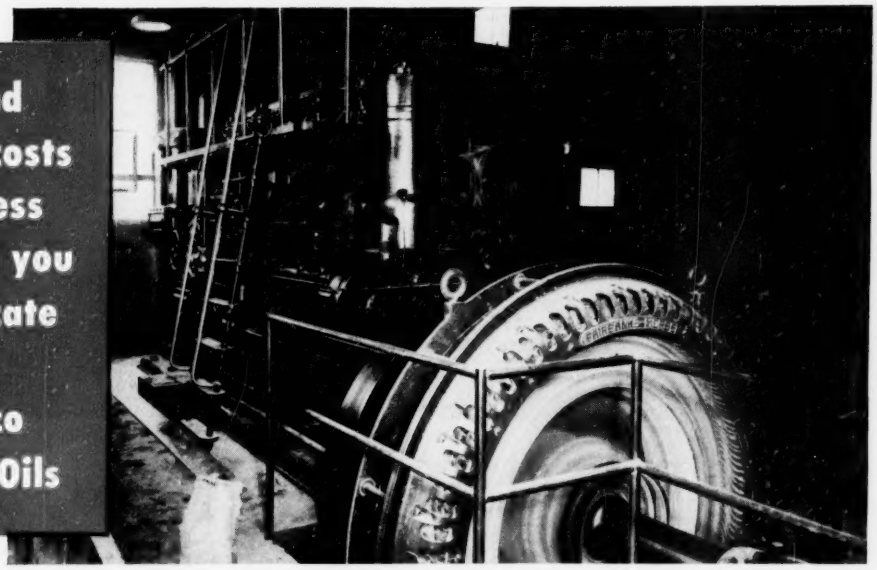


Photo courtesy Fairbanks, Morse & Co.

ANY Diesel lubricated with *Texaco Ursa Oil* is bound to run cleaner because *Texaco Ursa Oils* have high resistance to oxidation . . . and are designed to keep harmful carbon, sludge and varnish from forming. So rings stay free, valves work the way they should, ports stay open . . . assuring better compression and combustion.

In addition, *Texaco Ursa Oils* maintain their tough lubricating films in spite of heat and high pressure. Wear all but vanishes. Bearings and all moving parts last longer. No wonder maintenance costs and fuel consumption are less when *Texaco Ursa Oils* are on the job!

There is a complete line of *Texaco Ursa Oils*. They are approved by leading Diesel manufacturers, and are easily America's favorite Diesel lubricants – as shown by the fact that *more stationary Diesel h.p. in the U. S. is lubricated with Texaco Ursa Oils than with any other brand.*

Get a greater return from your Diesel operating dollar. A Texaco Lubrication Engineer will gladly help you. Just call the nearest of the more than 2,000 Texaco Wholesale Distributing Plants in the 48 States, or write:

The Texas Company, 135 East 42nd Street, New York 17, N. Y.

TEXACO

TEXACO Ursa Oils

FOR ALL DIESEL ENGINES

TUNE IN . . . TEXACO STAR THEATER starring MILTON BERLE on television every Tuesday night. See newspaper for time and station.